SUPPLEMENT.

The Mining Journal,

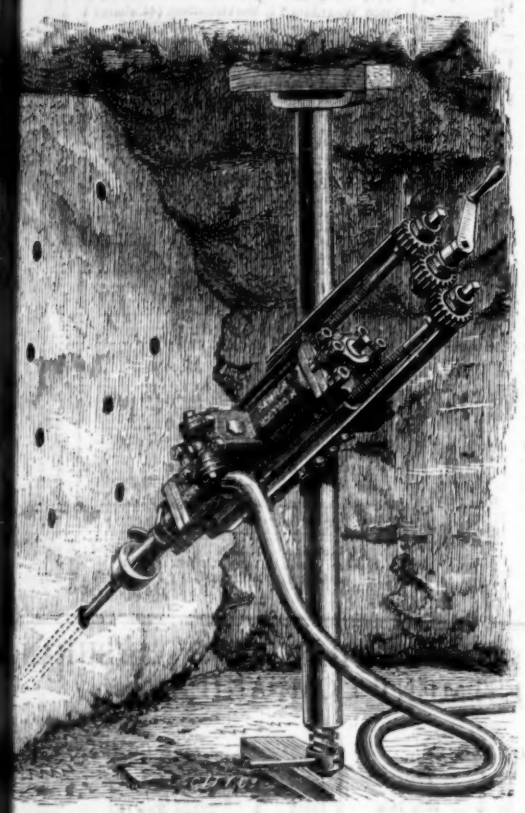
RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

[The MINING JOURNAL is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.]

No. 2560.—VOL. LIV. LONDON, SATURDAY, SEPTEMBER 13, 1884. PRICE (WITH THE JOURNAL) SIXPENCE BY POST £1 4s. PER ANNUM.

T SILVER MEDAL, ROYAL CORNWALL POLYTECHNIC
Highest Award for Effectiveness in Boring, and Economy in the Consumption of Air.
JUBILEE EXHIBITION, 1882.
THE PATENT
"CORNISH" ROCK DRILL.



ST SILVER MEDAL AWARDED AT BORING COMPETITION, DOLCOATH MINE, 1881.
"CORNISH" ROCK DRILL and "CORNISH" COMPRESSOR
now largely in use, and in every case are giving entire satisfaction.
Testimonials, Illustrated Catalogues and prices, apply to—
HOLMAN BROTHERS,
CAMBORNE FOUNDRY,
MAKERS OF
HELL & TREGONING'S PATENT PULVERISER, and HOLMAN'S PROVED STEAM or AIR PUMPING and WINDING ENGINE Underground Quarries or Shallow Mining. Indispensable for Sinking with Rock Drills. Also makers of all kinds of ING MACHINERY at
CAMBORNE FOUNDRY AND ENGINE WORKS,
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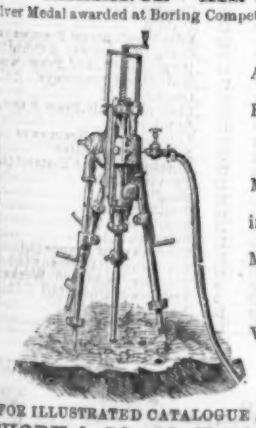
THE PATENT
"ECLIPSE" ROCK-DRILL
AND
"RELIANCE AIR-COMPRESSOR."
Silver Medal awarded at Boring Competition, East Pool Mine, Sept. 1883.



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Are NOW SUPPLIED to the ENGLISH, FOREIGN, and COLONIAL GOVERNMENTS, and are also IN USE in a number of the largest MINES, RAILWAYS, QUARRIES, and HARBOUR WORKS in GREAT BRITAIN and ABROAD.

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THE IRON AND COAL TRADES REVIEW
The IRON AND COAL TRADES' REVIEW is extensively circulated amongst the Producers, Manufacturers, and Consumers, Coalowners, &c., in all the Iron districts. It is, therefore, one of the leading organs for advertising every description of Iron Manufactures, Machinery, New Inventions, and all matters relating to the Iron Coal, Hardware, Engineering, and Metal Trades in general
Offices of the Review: 342, Strand, W.C.
Remittances payable to W. T. Pringle.

PATENT IMPROVED
"INGERSOLL ROCK DRILL."
MEDALS AND HIGHEST AWARDS
SEVEN YEARS IN SUCCESSION,
FOUR IN ONE YEAR.

American Institute, 1872.
American Institute, 1873.
London International Exhibition, 1874.
Manchester Scientific Society, 1875.
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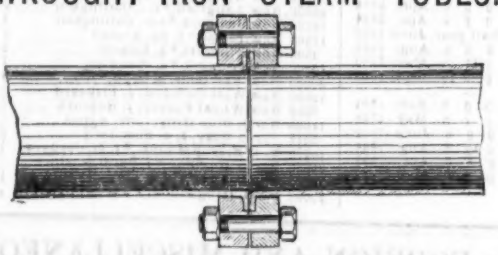
Royal Cornwall Polytechnic, 1875.
Rio de Janeiro Exhibition, 1875.
Australia Brisbane Exhibition, 1876.
Philadelphia Exhibition, 1876.
Royal Cornwall Polytechnic, 1877.
Mining Institute of Cornwall, 1877.
Paris Exhibition, 1878.

AWARDED FOR
SIMPLICITY in CONSTRUCTION.
AUTOMATIC FEED
(Perfect success)
GREAT STEADINESS.
GREAT POWER.
GREAT DURABILITY.
GREAT EFFECTIVENESS.

WROUGHT-IRON STEAM TUBES.



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FOR
HAND AND POWER.

DUNCAN BROS.,
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STONE MACHINE WORKS, LEICESTER.

New Patent Simplex Stone Breaker.
Patented June, 1884.
This Machine only has five wearing parts; others have 26.
LARGE SIZES.
Can be worked by hand or cattle Power.
IT HAS 24 ADVANTAGES OVER ALL OTHERS.
SEND FOR LISTS OF OUR OTHER PATENTS; ALSO RECENT TESTIMONIALS

J. S. MERRY,
ASSAYER AND ANALYTICAL CHEMIST,
SWANSEA,
SUPPLIES ASSAY OFFICE REQUIREMENTS AND RE-AGENTS.

AIR COMPRESSORS,

With R. SCHRAM'S
Patent
Inlet and Outlet Valves.
BOILERS, TURBINES.

SCHRAM'S IMPROVED
ROCK DRILL.
1600 in Use in all Parts of the World.

Complete Rock Boring Plants of the most approved construction for Railway Tunnels, Quarries, Shaft Sinking, Level Driving, Stoping, and Submarine Blasting.

All Kinds of Mining Machinery.

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LATE
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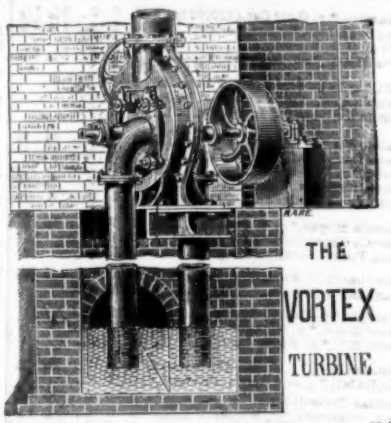

THE VORTEX TURBINE

A most efficient means of applying Water Power to all kinds of Machinery.

Largely used in DRIVING AIR COMPRESSORS, PUMPING, WORKING ORE-CRUSHING MACHINERY, and for other purposes in connection with MINING.
Successfully used in ELECTRIC LIGHTING, and in utilising DISTANT WATER POWER by means of ELECTRICITY.

A Pamphlet containing a full description of the Vortex, with several Illustrations and a number of Testimonials, can be obtained on application.

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TIMBER AND MINING STORES MERCHANT,
MORPETH.
Chocks, Sleepers, Shafts, Helves, Spokes, Naves, Felloes, Pit Props, Mining Timber, Tub-wood, Wagon-wood, &c., supplied at Market Value.
MINES BOUGHT. COMPANIES FORMED ON EQUITABLE TERMS.

MORDEY, CARNEY, AND CO. (LIMITED),
SHIPBUILDERS, AND MARINE AND GENERAL ENGINEERING WORKS,
DRY DOCKS, NEWPORT, MON.
All kinds of WROUGHT and CAST IRON STRUCTURAL WORK, including Girders, Tanks, Boilers, Colliery Plant, Winding Engines, Iron Coal Wagons, heavy Smith Forgings, Dock Gates and Caisons, and requirements of Harbour and Dock Works, &c., &c.
All Orders executed promptly, and Tenders from Plans and Specifications.

BELL'S ASBESTOS.

BELL'S PATENT ASBESTOS BLOCK PACKING for High-Pressure Engines

The following testimonials refer to this Packing:—

Mona Lodge, Amlwich, Anglesey,
2nd August, 1884.

DEAR SIR,—I have much pleasure in answering your note. Bad times in mining have compelled me to try all kinds of expedients in order to effect saving; some have succeeded and some have failed, but my underground manager, Capt. Hughes, has just said to me by the telephone—"The Asbestos Packing is the best thing ever brought here."

It saves money and trouble, but like my gas purifying oxide it lasts so long that you must not expect another order from me for twelve months at least.

Yours truly,
T. F. EVANS,
Late H.M. Inspector of Metalliferous Mines.

Mr. J. Bell.

Manchester, Sheffield, and Lincolnshire Railway—Steamship Department,
Grimsby, April 10th, 1884.

DEAR SIR,—I have much pleasure in stating that after a trial of over nine months, and comparing it with other packings, I can confidently recommend your Asbestos Packing. It is especially valuable when high-pressures are employed, as in cases where other packings have perished, owing to high temperatures, your packing has invariably stood well. I have also used it with complete success when a gland has heated with other packings, and also in cases of badly scored piston rods. I consider the results I have obtained by its use for our marine engines to have been in every way highly satisfactory. Yours truly,

G. H. CLARKE, Sup. Engineer.

Mr. J. Bell.

Department of the Director of Navy Contracts,
Admiralty, Whitehall, 20th June, 1884.

SIR,—I have to inform you that your tender has been accepted for Bell's Rolled Cloth Asbestos Packing to sample submitted:—Elastic core ... ... Square.
" " ... ... Round.

To Mr. John Bell. JOHN COLLETT, Director of Navy Contracts.

The Patent Block Packing is square, as Fig. 1 and Figs. 2 and 3 represent the Round Block Packing with solid and hollow rubber core, and Fig. 4 without core, but with rubber inlaid. As these packings are extensively imitated, and as it is a common practice among dealers and agents to supply the cheaper manufactures at my list prices, users are requested to see that the packing supplied to them bears the trade mark.

BELL'S ASBESTOS BOILER PRESERVATIVE.—This useful mixture by absorbing the free oxygen that is in the water entirely checks pitting and corrosion. It also disintegrates incrustation so immediately as to prevent its adhering to the plates. Not only is a great economy of fuel effected by keeping boilers clean, but the risk of having the plates burned is thereby obviated. It has been computed that 1/16 in. thick of incrustation causes a waste of 15 per cent. of coal; 1/4 in., 80 per cent.; 1/2 in., 150 per cent. Thus the Preservative avoids the great risks which are inseparable from scaled plates, lengthens the life of a boiler, and covers its own cost a hundredfold by economy of fuel. It is entirely harmless, and has no injurious action on metals. It can be put into the feed tank or boiler, as may be most convenient. Sold in drums and casks bearing the Trade Mark, without which none is genuine.

BELL'S ASBESTOS YARN and SOAPSTONE PACKING for Locomotives and all Stationary Engines running at very high speed with intense friction.

Sandwell Park Colliery, Smethwick, 1st February, 1884.

To Bell's Asbestos Works.

DEAR SIRS,—I have much pleasure in stating that I have used your Asbestos Packing for the last 13 months for our large winding engines which are running night and day, and also for the fan, pumping, and hauling engines at the above Colliery, and during that period we have not used more than one-third the Packing we had formerly; and this I attribute to your Packing on account of its great durability and general excellence of quality.—I am, dear Sirs, yours faithfully,

THOMAS WINTER, Colliery Engineer.

TRADE MARK.

BELL'S ASBESTOS.

The goods of this house are of the highest quality only, and no attempt is made to compete with other manufacturers by the supply of inferior materials at low prices. All "home" orders should be sent direct to the undermentioned depôts and not through Agents or Factors.

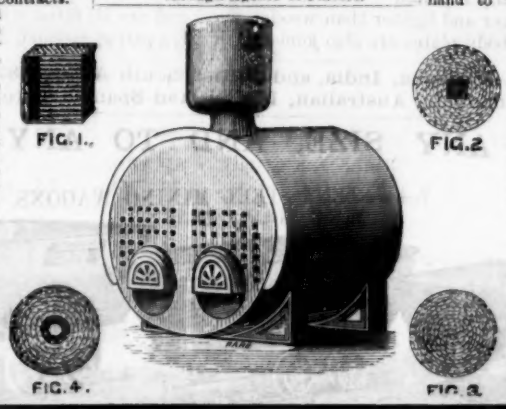


FIG. 1. FIG. 2 FIG. 4. FIG. 3.

BELL'S ASBESTOS BOILER AND PIPE COVERING COMPOSITION, for coating every class of steam pipes and boilers, non-combustible and easily applied when steam is up; adheres to metals and preserves them from rust; prevents the unequal expansion and contraction of boilers exposed to weather; covers 50 per cent. more surface than any other coating, and is absolutely indestructible. It can be stripped off after many years' use, mixed up with 20 per cent. of fresh, and applied again. The composition is supplied dry, and is only to be mixed with water to the consistency required for use.

A Horizontal Boiler, 17 ft. 6 in. long, 15-H.P., gave the following results:—

Temperature on Plates - - - 186 deg.
" " Covering - - 94 deg.

One ton of coal was saved per week, and although the fire was raked out every evening 20 lbs. of steam were found in the boiler next morning.

The following Testimonials refers to this Covering:—

Offices of the Wimbledon Local Board, Wimbledon, Nov. 28th, 1883.

DEAR SIR,—It may interest you to know that we save exactly 40 per cent. in fuel through using your covering. Yours truly, W. SANTO CRIMP, C.E., F.G.S.

The Tamar and Kit Hill Granite Company (Limited),
Gunnislake, Tavistock, 8th April, 1884.

Mr. John Bell, Southwark, S.E.

SIR,—I have much pleasure in stating that the Asbestos covering applied by you to the boiler of our travelling crane at Kit Hill has yielded most remarkable results. Since it has been in use we have saved fully half our coals, and have effected a great saving in the time it takes to get up steam, which is often a matter of great importance to us. I should add that the crane runs on high gantries, and is fully exposed to all weather. I have formed the highest opinion of your Asbestos as used for this purpose, and as you are aware, have had another boiler similarly covered, though it has not since been used. I can most strongly recommend the material.

I am, Sir, yours faithfully, W. J. CHALK, Assoc.M.Inst.C.E., Engineer and Manager.

BELL'S ASBESTOS and INDIA-RUBBER WOVEN TAPE and SHEETING, for making every class of Steam and Water Joints. It can be bent by hand to the form required without puckering, and is especially useful in making joints of manhole and mudhole doors. It is kept in stock in rolls of 100 ft., from 1/2 in. to 3 in. wide, and any thickness from 1/16 in. upwards. Manhole covers can be lifted many times before the renewal of the jointing material is necessary. The same material is made up into sheets about 40 in. square, and each sheet bears the Trade Mark, without which none is genuine. It is very necessary to guard against imitations of this useful material, and to secure themselves against being supplied with these inferior articles at my price, users are recommended to see that every 10 ft. length of the Asbestos Tape purchased by them bears the Trade Mark.

BELL'S SPECIAL LONDON-MADE ASBESTOS MILLBOARD for Dry Steam Joints, made of the best Asbestos fibre, is well-known for its toughness and purity, and is absolutely free from the injurious ingredients frequently used to attain an appearance of finish, regardless of the real utility of the material. Made in sheets measuring about 40 in. square, from 1-64th in. to 1 in., and 1/2 millimetre to 25 millimetres thick. Each sheet bears the Trade Mark.

The following copy of acceptance of tender refers to above:—

Department of the Director of Navy Contracts,
Admiralty, Whitehall, S.W., 17th May, 1884.

SIR,—I have to inform you that your tender for Asbestos Millboard has been accepted.—Mr. John Bell. JOHN COLLETT, Director of Navy Contracts.

BELL'S ASBESTOS EXPANSION SHEETING (PATENT). This Sheeting is another combination of Asbestos with India-rubber, giving to the steam user the special advantages of both materials. The India-rubber Washer is protected from the action of heat and grease by an outer coating of volcanised Asbestos Cloth, thus producing an excellent joint where expansion and contraction render other materials unserviceable. This material is admirably suited to steam pipe joints and every class of valve. Valves made of this material are very durable, as they are not subject to injury by oil.

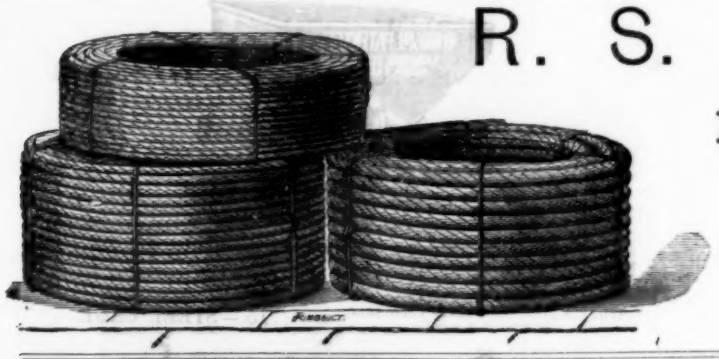
BELL'S "ASBESTOS LUBRICANT." REGD

ILLUSTRATED PRICED CATALOGUE FREE ON APPLICATION TO

BELL'S ASBESTOS WORKS, SOUTHWARK, LONDON, S. E.

OR THE DEPOTS—118a, SOUTHWARK STREET, S.E.,

Victoria Buildings, Deansgate, MANCHESTER. 11 and 13, St. Vincent Place, GLASGOW. 39, Mount Stuart Square, CARDIFF. 21, Ritter Strasse, BERLIN.



R. S. NEWALL AND CO.,

Sole Patentees of Untwisted Wire Rope.

Iron & Steel Ropes of the highest quality for Collieries, Railways, Suspension Bridges, &c.

PATENT STEEL FLEXIBLE ROPES AND HAWSERS.

IRON STEEL, AND COPPER CORDS. LIGHTNING CONDUCTORS.

COPPER CABLES of high Conductivity for Electric Light and Power.

London: 130, STRAND, W.C. Liverpool: 7, NEW QUAY.
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MANUFACTORY: GATESHEAD-ON-TYNE.

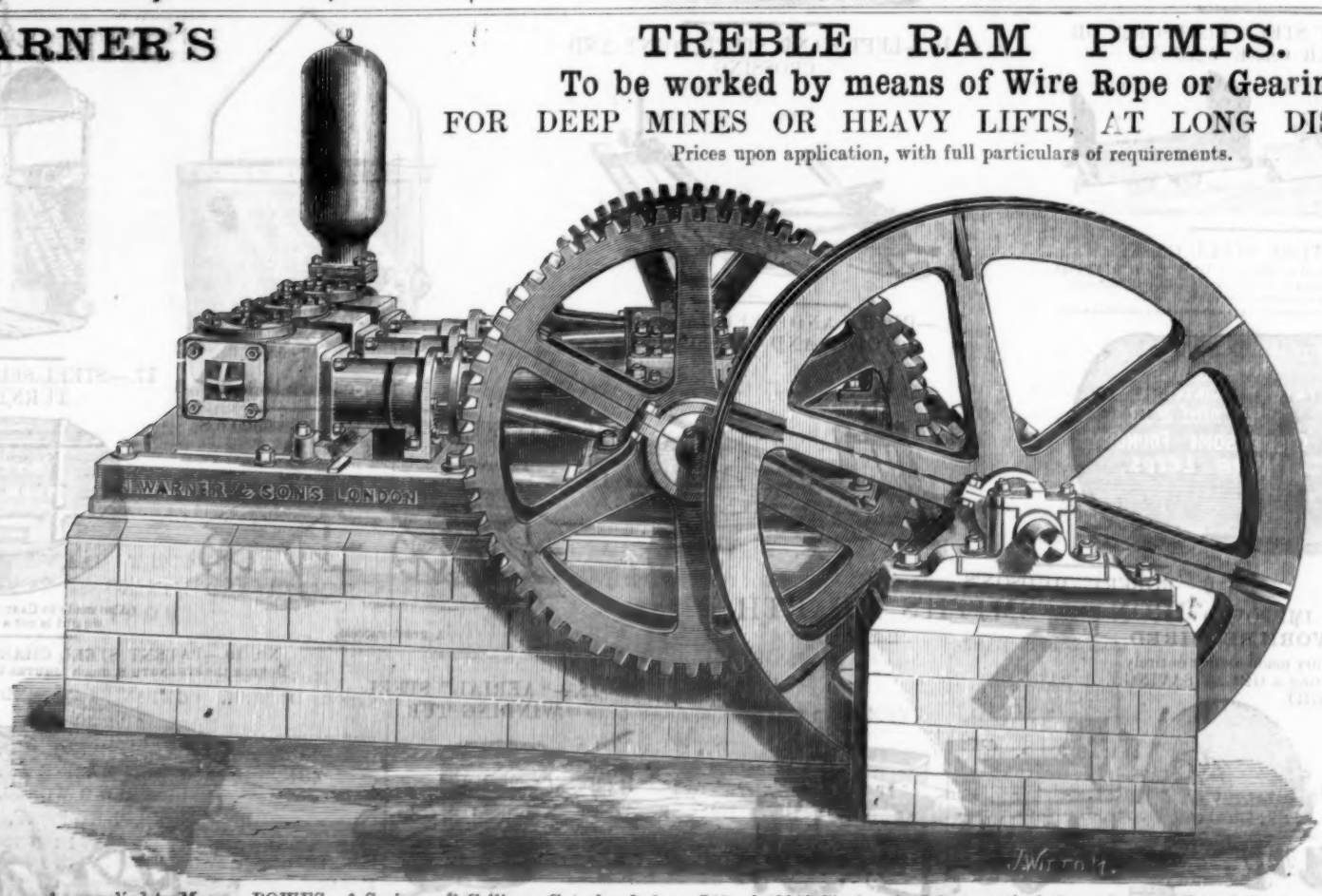
WARNER'S

TREBLE RAM PUMPS.

To be worked by means of Wire Rope or Gearing.

FOR DEEP MINES OR HEAVY LIFTS, AT LONG DISTANCES.

Prices upon application, with full particulars of requirements.



As supplied to Messrs BOWES, of Springwell Colliery, Gateshead, for a Lift of (600) Six hundred feet vertical through two miles of pipes.

JOHN WARNER AND SONS, THE CRESCENT FOUNDRY, CRIPPLEGATE, LONDON, E.C.

R. HUDSON'S

Patent Steel Trucks, Points and Crossings,

PORTABLE RAILWAY, STEEL BUCKETS, &c., &c.

Telephone No. 14.
In connection with the Leeds Exchange, and all the principal Hotels and places of business in the town.

GILDERSOME FOUNDRY, NEAR LEEDS.

(Near Gildersome Station, G.N.R. Main Line, Bradford to Wakefield and London, via Laisterdyke and Ardsley Junctions.)

Registered Telegraphic Address:—"GILDERSOME, LEEDS." A. B. C. Code used.

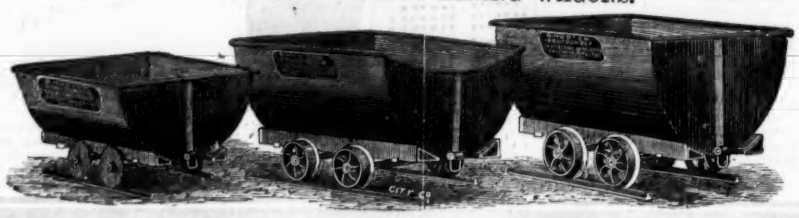
UPWARDS of 25,000 of these Trucks and Wagons have been supplied to the South African Diamond Mines; American, Spanish, Indian, and Welsh Gold, Silver, Copper, and Lead Mines; Indian and Brazilian Railways, and to Railway Contractors, Chemical Works, Brick Works, and Coal and Mineral Shippers, &c., &c., and can be made to lift off the underwork, to let down into the hold of a vessel, and easily replaced. They are also largely used in the Coal and other Mines in this country, and are the LIGHTEST, STRONGEST, and most CAPACIOUS made, infinitely stronger and lighter than wooden ones, and are all fitted with R. H.'s Patent "Rim" round top of wagons, requiring no rivets, and giving immense strength and rigidity. End and body plates are also joined on R. H.'s patent method, dispensing with angle-irons or corner plates.

Patented in Europe, America, Australia, India, and British South Africa, 1875, 1877, 1878, 1881, and 1883.
N.B.—The American, Australian, Indian, and Spanish Patents on Sale.

CAN BE MADE TO ANY SIZE, AND TO ANY GAUGE OF RAILS.

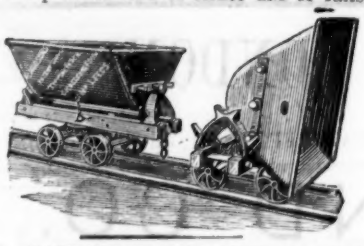
1.—PATENT STEEL END TIP WAGONS.

7.—PATENT STEEL MINING WAGONS.

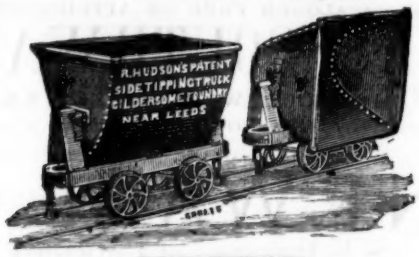


12.—PATENT STEEL HOPPER WAGON, WITH BOTTOM DOORS.

2. PATENT UNIVERSAL TRIPLE-CENTRE STEEL TIPPING TRUCK,
Will tip either SIDE or either END of rails.

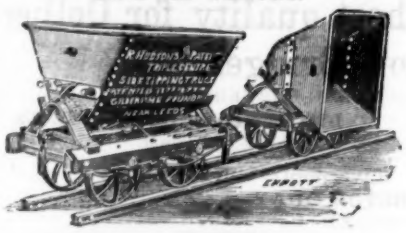


8.– PATENT DOUBLE-CENTRE STEEL SIDE TIP WAGONS,
Will tip either side of Wagons.

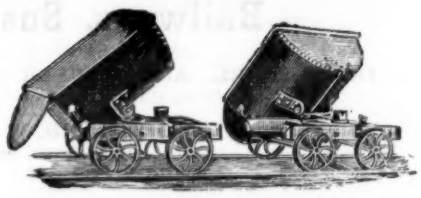


13.—PATENT STEEL HOPPER WAGON.

3.—PATENT TRIPLE-CENTRE STEEL SIDE TIP WAGONS.

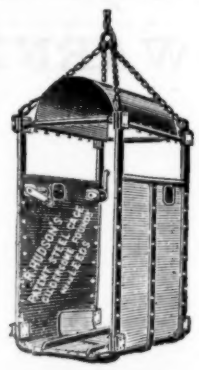


9.—PATENT STEEL ALL-ROUND TIP WAGON.

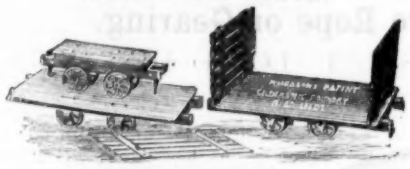


14.—SELF-RIGHTING STEEL TIP BUCKET.
(The "CATCH" can also be made SELF ACTING if desired.)

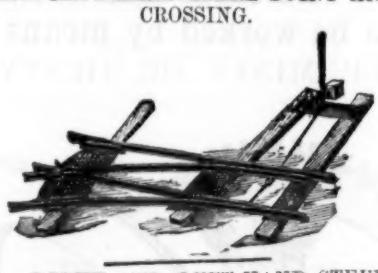
15.—STEEL CAGE.



4. PATENT STEEL PLATFORM OR SUGAR CANE WAGON.

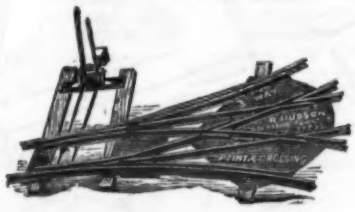


10.—LEFT-HAND STEEL POINT AND CROSSING.

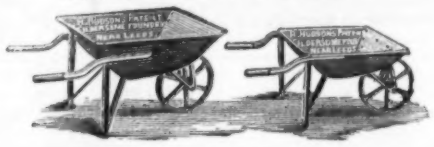


5.—PATENT STEEL CASK.
As supplied to H.M. War Office for the late war in Egypt).
DOUBLE the STRENGTH of ordinary Casks without any INCREASE in weight.
(Made from 10 gals. capacity upwards to any desired size.)

11.—RIGHT AND LEFT-HAND STEEL POINT AND CROSSING.

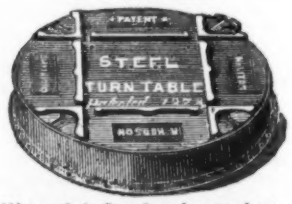


16.—PATENT STEEL WHEELBARROWS.
Made to any Size.
Lightest and Strongest in the Market.



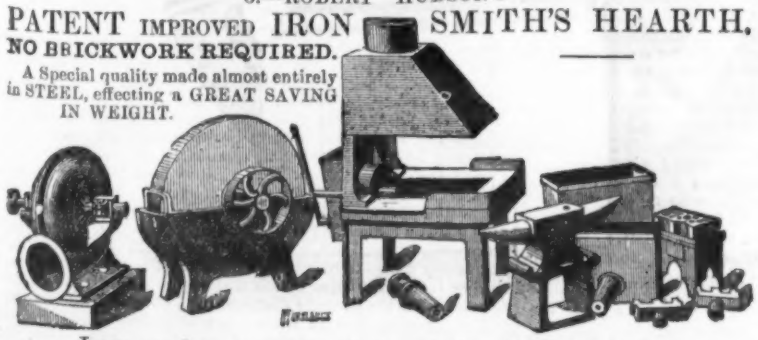
A great success.

17.—STEEL SELF-CONTAINED TURNTABLE.



(Also made in CAST IRON for use where weight is not a consideration.

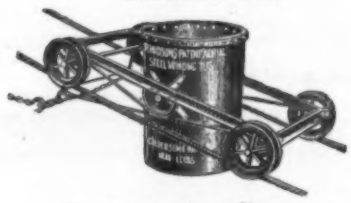
6.—ROBERT HUDSON'S
PATENT IMPROVED IRON SMITH'S HEARTH,
NO BRICKWORK REQUIRED.
A Special quality made almost entirely in STEEL, effecting a GREAT SAVING IN WEIGHT.



Large numbers in use by all the principal Engineers in this country and abroad.

No. 19.—PATENT STEEL CHARGING BARROW,
DOUBLE the STRENGTH & much LIGHTER than ordinary Barrow

18.—"AERIAL" STEEL WINDING TUB.



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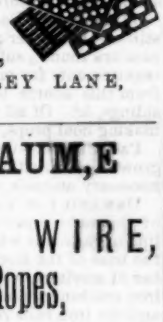

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CORNISH CHINA CLAY.*

BY JAMES QUICK,

Author of Essays on the Cornish Tin Mines; the Stannaries; the Cornish Pumping Engine; the Cornish Pilchard Fisheries; compiler of a British Maritime Gazetteer, &c., &c.

The art of pottery being one of those branches of industry which supply the immediate wants of the human race originated in the earliest period of mankind's existence; and at the present day no other of the useful arts has attained a higher degree of excellence in its various details, or has such a universal demand for its numerous products. In discovering suitable materials for the pottery manufacture, as well as in perfecting the different processes of the industry, a vast amount of talent in every age and in almost every nation has been expended; and for the antiquary and the historian the subject, as a whole, presents an inexhaustible mine of research. The story of Bernard Palissy, in France, wasting his time, his energy, and his money in his efforts to solve the mystery of the white enamel, and that of Baron Böttcher, the chemist in Saxony, whose unremitting perseverance through a long period of years was at last crowned with success by the merest accident, are vested with thrilling interest. The porcelain or white earthenware products of China and Japan, where the manufacture was probably started many years previous to the Christian era, had, on account of their pure whiteness, their semi-transparent texture and superiority of glaze, long been the envy of European artists, when Böttcher one day inspecting a white substance found in Saxony, and newly introduced as hair powder, was struck with its adaptability to the requirements of pottery, and afterwards identified it as being the much-coveted kaolin, or the same material as that used by the Chinese. Subsequently kaolin in various degrees of purity or suitability for the manufacture of porcelain was found in several other parts of Europe, and it is now regarded by many geologists as consisting of the felspar of granite in a state of decomposition, and after passing through the raising process somewhat resembles ordinary whiting, but has a much greater density. The kaolin, or as it is more commonly called in this country, china-clay, and sometimes porcelain clay, used at the Staffordshire potteries, and which is the chief constituent of all the hard porcelain or finer sorts of earthenware, is obtained almost wholly from the county of Cornwall and the adjoining district of Dartmoor. It is the purest or most highly esteemed description of the clay known, and may be called the mainstay of our English manufacture, without which we could not possibly hold our pre-eminence over other nations in the excellence of our products, and in a commercial point of view the china-clay trade of Cornwall has a much greater importance than has hitherto generally been supposed.

The application of Cornish china-clay to the purposes of pottery is due to the enterprising spirit of William Cookworthy, of Plymouth, whose persevering efforts in the cause of English ceramic art are only surpassed by those of Josiah Wedgwood, the founder, or rather the great improver, of the Staffordshire potteries. Mr. Cookworthy opened a pottery at Plymouth in 1733,† and probably used at first only the inferior clays of Dorset and Devon. Owing, however, to the meagre information that is now extant about Cookworthy's labours, the date when he discovered the china-clay or first applied it to any practical use cannot be definitely ascertained; but from his travels through Cornwall as a chemist, and his peculiar aptitude for geological research, its existence is likely to have been known to him long before he thought of turning it to account. Possibly, too, he may have used the clay for some time privately, reserving his knowledge from the public until a favourable opportunity occurred of divulging it, in accordance with that jealous spirit of secrecy so characteristic of discoverers in the 18th century. It appears to have been about the year 1755‡ that he found a stone at St. Stephen's, Cornwall, which he proved to be identical with the Chinese "petuntz," or as it is now called china-stone, used for forming the glaze on porcelain, and which is the felspar of granite in a less advanced stage of disintegration than when considered as "clay." From a short account of the life of Cookworthy, published by his grandson,§ it appears that "he first found china-clay and stone at Tregoning Hill, then in the parish of St. Stephen's, and afterwards in domain of Boconnic, the family seat of Thomas Pitt, nephew of the Earl of Chatham, and afterwards Lord Camelford."

In the year 1768 Cookworthy, in company with Lord Camelford and others, secured by patent the exclusive use of Cornish china-clay and stone, and with these materials carried on the porcelain manufacture for five or six years at Plymouth; that town, of course, being able thereby to boast that it is the place in England where the hard, or true porcelain, was first made. Cookworthy chose as the mark for his ware the astronomical symbol for the planet Jupiter, which was the sign formerly placed on ingots of Cornish tin, and which is used in a corrupted form by physicians when writing their prescriptions. The Plymouth adventure, however, ultimately proved a commercial failure, and in 1774, Cookworthy sold his patent to Richard Champion, a merchant of Bristol, and the works were transferred to that city. Soon afterwards Champion, in conjunction with other eminent potters, removed the undertaking to Tunstall, in the Potteries, and thus raised to the zenith of its completeness our present wonderful and extensive British earthenware industry.

Both Cookworthy and Champion appear to have exercised an extraordinary perseverance in discovering and mastering the details of porcelain manufacture, which in several ways they are said to have ultimately succeeded in very greatly improving. They attracted workmen from various potteries, and, according to Marryat's History of Pottery, Bone, the great enameller was employed for some time at Plymouth. It may be remarked that Wedgwood violently opposed both the patent taken out by Cookworthy and its renewal by Champion, as he himself, notwithstanding his many improvements in pottery, would never entertain the idea of one for his own discoveries.‖ Champion's claim to merit as a manufacturer of porcelain seems to me to have been too slightingly regarded by historians and pottery connoisseurs. In reply to Wedgwood's address to Parliament¶ opposing his application for an extension of Cookworthy's patent, Champion shows that he had been connected with Cookworthy nearly from the time of the granting of the original patent, and asserts that his hazard and expense were many times greater than those of Cookworthy, and that it was owing to his labours and his fortune that the Plymouth undertaking had advanced "from a very imperfect to an almost perfect manufacture."

The district of Cornwall in which the largest deposits of china-clay have been found is in the neighbourhood of St. Austell, in the parishes of St. Austell, St. Mewan, St. Stephen's, St. Dennis, St. Enoder, Roche, and St. Blazey, and there are deposits on a smaller scale in the eastern part of the county at Blisland and St. Breward, near Bodmin, and in the west near Helston. Lee Moor, a part of Dartmoor, near Plymouth, also yields considerable quantities of the clay; but as the largest works there are held by merchants who are large raisers in the St. Austell district, it can hardly be said that the Lee Moor enterprise enters into any competition with the Cornish trade.

The other principal materials used in the preparation of porcelain are bones and flint, the latter being employed for hardening the ware. Pegmatite**—a substance found rarely, but which deserves more attention from geologists than has hitherto been bestowed upon it—is said to contain in its natural state all the necessary ingredients for porcelain. Inferior descriptions of clay used in the potteries are obtained from the counties of Devon and Dorset, especially from the neighbourhood of Teignmouth, where the much used ball-clay is found. At present there are about 100 china-clay works in Cornwall, leased or rented from the freeholders of the land, and it has been roughly calculated that about 1600 working hands altogether are employed. In Devonshire there are seven different clay-works all in the neighbourhood of Lee Moor, and it may interest my readers to compare the present extent of Cornish clay-raising with that of 70 years ago. From an article in the Annals of Philosophy for 1814,†† it appears that the preparation of clay for the manufacturer was in 1870 confined to the parishes of St. Stephen's and St. Deny's (St. Dennis), there being in all seven works—two at Hendra, in St. Dennis, and five in St. Stephen's. One of the works was carried on by a company at Plymouth, who prepared the clay for sale, and the rest by manufacturing companies of Staffordshire and other places for their own consumption. Attached to each of the works was a quarry for granite. The clay was conveyed in carts to St. Austell and Charlestown, whence "the greater part, if not the whole," was shipped to Plymouth, and thence to the potteries. In 1810 the quantity raised at Trethorsa (one of the works in St. Stephen's) was supposed to be about 300 tons, and 13 hands were employed. The water supplying the works was carried off by subterraneous channels, which in some cases led to shafts communicating with the mine adits in the rock beneath.

The present method of raising the china-clay in Cornwall is interesting. With the exception of a few modern improvements it is very similar to that pursued for many hundreds of years past by the Chinese clay-raisers; and, indeed, many of the plans in clay-raising and pottery manufacture invented and adopted by Europeans are merely unconscious repetitions of those practised long before by the workers in China and Japan. The clay is worked in open cuttings, which at some of the principal works are of very considerable extent and depth, the latter varying from 30 to 120 ft. Over the sloping sides of these workings streams of water are directed, which in their course carry with them the deposit of clay mixed with sand and mica, the proportions varying at different works, but averaging about 8 tons of sand and mica per ton of china-clay. During the progress of the streams down the sides, or, as they are locally called, stopes, of the cuttings, shovels are used for causing the separation of the clay and sand, and the several streams meet at bottom, carrying with them the liquid mixture into a reservoir, called a "sand-pit," where the sand and much of the mica become deposited. At some pits the liquid is then pumped, and at others it flows by natural gravitation into a series of divided channels, called "micas." These are about 2 ft. wide and 4 in. deep, and from 100 to 500 ft. in length. They have a slight fall, and have weirs or dams called traps placed about 20 ft. apart, which of course check the stream at intervals, and cause the heavier portions of the mixture to fall to the bottom, and these latter are afterwards run off or rewashed and sent away as refuse. Passing from the micas, the solution being clay alone, flows into large settling pits varying from 40 to 50 ft. square and 6 ft. deep, where it settles, the water running off as the deposit becomes denser and the pit fills. From these pits the deposit is again sluiced into large tanks varying from 50 to 80 ft. square, and about 6 ft. deep, where the clay is allowed to concentrate into a thin putty state, after which it is trammed or sluiced into the drying kiln called the "dry." Or if the clay is to be dried in the open air it is run off from the pits into pans which are excavations from 1½ to 2 ft. deep, of various sizes, and sanded at bottom, and when sufficiently solid is cut into square blocks, and ranged in rows on the ground, and being exposed to the influence of sun and wind soon becomes dry. But nearly all the works now have kilns for drying the clay, these varying from 50 ft. to 200 ft. in length, and from about 9 ft. to 12 ft. in width. In 1801 Messrs. John Lovering and Co., china-clay merchants, of St. Austell, patented an invention for taking out the small vegetable and other foreign substances which cause specks in the clay, so objectionable in high-class china manufacture.

A marked feature of the Cornish county, and also of parts of Devonshire are the numerous white and red coloured streams of refuse water which respectively are discharged from the clayworks and the iron mines, and flow through the green fields and valleys till they reach the sea, where they often form a serious obstacle to the prosecution of maritime affairs. Such, for instance, appears to have been especially the case some years ago with regard to the pilchard seine-net industry of Mevagissey. Mr. Matthias Dunn, of that place, informs the writer of this article that in 1818 the seine fishery of the town and neighbourhood was in a very thriving condition. But about that time the raising of china-clay began to be widely extended in the neighbourhood of St. Austell, and the refuse white waters from the clayworks frequently polluted the sea miles from the shore, and, of course, thereby hindered the seine-men from discovering the object of their search, and, moreover, drove the fish from the favoured places where the seines could be used. The number of seines at Mevagissey had dwindled down from 44 in 1818, to two in 1867, and now no fish has been taken by a seine at that town for many years.‡‡ The town of Pentewan, situate at the mouth of St. Austell river, possessing a large dock and a line of railway from St. Austell, also suffers very severely in its trade, owing to the immense quantities of sand which, in years past, have been carried from the clayworks to the sea, and which, by certain winds, is beaten up into a bar at the harbour entrance, although during the last few years as little sand as possible has been sent down to Pentewan. As may be supposed, a clear stream is a rare in the neighbourhood of St. Austell, and so accustomed are the horses and cattle there to drink from the whitened streams, that they do not care to drink clear water, and it is by a no means uncommon thing for a wagoner, when going out of the district with his team, to take a lump of clay with him to "muddle" any water that may not have clay in it before letting the animals drink, the clay being perfectly harmless when taken in small quantities.

As in excavating and preparing the clay no great amount of skilled workmanship is required only men of the common labourer class are, as a rule, employed. These are generally under the superintendence of foremen or, as they are locally termed, captains, who are men that have raised themselves by ability and experience. The wages of the men are 2s. 6d. for a day's work of 7½ hours, a rate of pay which, especially when considering the abundant time afforded for extra work, and the facilities in Cornwall for cheap living among the poorer classes, compares most favourably with the wages earned by labourers of other avocations. The men, too, are not checked for rainy days when they cannot work, and the occupation is a very healthy one. In some parts also a system of piecework is adopted, under which the men usually make from 3s. to 3s. 6d. per day. With these earnings the Cornish labourer, renting, perhaps, a small respectable house for 3l. or 4l. per annum, and if he be married his wife and children probably also being employed in the clay-works or in connection with the neighbouring tin and copper mines, may be said to rank in the social scale with skilled artizans in many other parts of England.

The arrangements for transporting the clay from one part of the county to another are almost as complete as can be desired. The Cornwall Minerals Railway, running from Fowey to New Quay, passes through the important clay district of St. Austell, and connects the English and Bristol Channels; and the Cornwall Railway, stretching the whole length of the county, has many small branches for conveying mineral and other commodities. It is noticeable that the clay sent to the English potteries is taken from Cornwall wholly by water—that for Staffordshire being shipped to Runcorn, and that for Worcestershire to Gloucester, from which places the material is carried by canal; and this practice of transporting the clay by shipping probably arose from the strong preference shown by Wedgwood for water carriage for porcelain rather than carriage by land, and his remarkable efforts in farthering the cause of canal navigation in the neighbourhood of the potteries.

Of late years, also, the Cornish china-clay has been applied to a variety of purposes besides that of making porcelain; and doubtless ere long many more channels of usefulness may open up for it, and Cookworthy's discovery even yet attain a still greater importance among our English commercial products. Indeed, it is calculated that only about one-third of the total quantity now annually raised (the total, in round numbers being about 200,000 tons of clay and stone) is employed in the home manufacture of porcelain, and more than another third of the total quantity is exported to foreign countries. The clay, on account of its bleaching properties, is used for sizing cotton goods in the Lancashire and Cheshire districts, and also very largely among papermakers. It is also used in France in the preparation of ultramarine, and in Germany in connection with the manufacture of gilt mouldings. It has also been alleged that both on the Continent and in England the kaolin is widely used for adulterating food. In Hunt's Romances and Drolls of the West of England a strange superstition is recorded to the effect that a remarkable impression on a mass of rock called Tolcarne, near Penzance, was made by the heel of his Satanic Majesty, as that monarch leapt from the earth whilst carrying off a dishonest miller who had mixed china-clay with his flour.

No generally accepted conclusion has yet been arrived at as to the causes of kaolin formation. Indeed, no very great amount of scientific enquiry has yet been brought to bear upon the subject. Watt's Dictionary of Chemistry, Vol. I., says:—It (kaolin) may be supposed to be formed from orthoclase, or $K_2O\ Al_2O_3\ 6SiO_2$, by the extraction of the whole of the potash and two-thirds silica, and addition of two atoms water; but offers no suggestion as to how this may by nature be brought about. Mr. J. H. Collins, F.G.S., Public Analyst for Cornwall, in a paper read before the Society of Arts in 1876, expresses an opinion that the clay is formed through the action of fluorine in the granite, because fissures which invariably contain minerals (tourmaline and mica), of which flourine is an essential ingredient, are always present in the clay. Tin, too, is frequently found in connection with kaolin, which some geologists believe is brought there by the action of flourine. To this theory of formation we are strongly disposed to incline. Mr. Collins has himself acted upon granite with dilute hydrofluoric acid, and without otherwise altering its appearance changed it into kaolin. It may be mentioned that most of the kaolin found in Europe consists with slight variations of $Al_2O_3\ 2SiO_2 + 2H_2O$.

* This article originally appeared in the Quarterly Journal of Sciences for October, 1877; but is now considerably altered, and brought down to date.

† See a small pamphlet entitled Relics of William Cookworthy, by John Prideaux. London: Whittaker and Co. 1853.

‡ This was the first time that china-stone was found in Europe.

§ Memorials of Wm. Cookworthy, by his Grandson, with an Appendix. London, 1854. Also another Appendix, 1872.

‖ This fact is shown in one of Wedgwood's letters, published in Meteyard's Memorials of Wedgwood, p. 15.

¶ A copy of Wedgwood's Address and Champion's Reply may be seen in the Library of the British Museum.

** See Tomlinson's Cyclopædia of Useful Arts.

†† Vol. III., old series.

‡‡ See an Article by the writer of this one, on the Cornish Pilchard Fisheries in Fraser's Magazine for February, 1877.

Original Correspondence.

CANADIAN MINING, RAILWAY, AND GENERAL INTELLIGENCE.

SIR,—The British Scientific Association and their meeting in Montreal will be of great benefit to Canada. While England has the greatest number of her subjects out of the British Isles, and her colonial territory is so much larger, and abounds in undeveloped resources to so great an extent, it is little wonder that the minds of the present generation should turn to her greater empire. The old Cobden theory of letting the colonies go and throwing off the colonies as useless has now few adherents. All Europe appears to have become active in the work of colonisation, whether we look at the French or Russian, whether in Asia or Africa. It is little wonder then that with such a fair domain as England possesses in the Dominion of Canada the British Scientific Association should have recognised it, and accorded to Montreal the honour of the first colonial meeting. It will be of great benefit to Canada in bringing back to the mother country the stories of what they have seen with their own eyes. The friends of the members of the Association will learn from trustworthy advice the great gem which belongs to the Crown of Victoria, and which is now beginning to sparkle. Many of the members have gone to the "end of the track." Taking boat at Owen Sound, they passed through Lake Huron, passed through the Sault St. Marie Canal, crossed Lake Superior, took cars at Port Arthur, and arrived at Winnipeg, over 1000 miles from Toronto. Thence they took car again, and passing over the Prairie Section arrived at the summit of the Rocky Mountains, nearly 1000 miles further. It was a beautiful trip, and they were much pleased with the country. Even the Hon. Alexander McKenzie (who is the Opposition leader) had to acknowledge that it was a wonderful work, and to congratulate the company on their success in carrying it through. In another year or two it will be finished, and then the stream of travel from the east to the west will commence through British territory.

The meeting for the Federation of the Empire that was held lately in London is another sign that the people of England are beginning to find out that there are more British subjects out of England than there are in it. It is a happy move, and probably it may eventually embrace the whole of the English-speaking people. At the time of the Tilden and Hayes election the people of the States very nearly came to a fight. The vote for President was close, and eventually it turned out that Tilden was elected, although Hayes reigned the whole four years. It would be much easier for the States to have a Judicial Committee of the Privy Council, to settle those matters without war—a sort of quasi-foreign tribunal, composed of learned men, and entirely unbiassed. But the United States has no tribunal of this kind, and it is too much to expect that if Cleveland is elected they will quietly submit to allow Blaine to be counted in, and reign in the White House.

We had a dispute about the boundaries of Ontario and Manitoba; but it is all settled now by the decision of the Privy Council, and we are satisfied. How much better is this than war and trouble, and sacrificing a lot of innocent people? Such a safety-valve is what the United States requires, for political warfare wages hot, and it cannot be expected that the people will submit to fraud again so quietly as they did at the time of Hayes's reign. The Judicial Committee have decided the boundary between Manitoba and Ontario, but they have not decided the northern boundary. The question still remains—Is Ontario bounded on the north by the Albany river as in the award, or is the whole territory east of the line drawn due north from the confluence of the Rivers Mississippi and Ohio a part of Ontario or a part of the Dominion? How far north does Ontario extend? Probably the Imperial Legislation that is still necessary will settle all the questions, for while they are about it they may as well settle the question how far north does Quebec extend?

One thing is certain. The Government of Ontario have got a large accession to the country, or rather to what was supposed to be the country; but this territory will throw on the Government additional duties and expense. It is a country which is rich in minerals, and if we go to Hudson's Bay will give us a seaboard, and make Ontario a maritime province. Now is the time for Mr. Mowat, Mr. Pardee, and Mr. Hardy to study up mineralogy, and try if they cannot do as well as Sweden and Norway and part of Germany in developing the mineral resources. Good anthracite coal is said to have been found in one of the islands in the Hudson's Bay. There is also found lignite on Maniatibi river, while iron, lead, and silver ore are known to be present. Our mineral laws are a disgrace to the country. The Ontario Government have not cared one atom for minerals, while they have expended plenty of money in encouraging agriculture. Now they have a mineral country, and we will see what they will do with it.

The Globe newspaper has got a very bad attack of Canada Pacific on the brain. It arose from the hot weather, superinduced by money. The success of the undertaking has been so great that they cannot understand it. The experimental farms of the company, in what is called the "dirt hills," are reported successful, and this is rubbing salt into their wounds, as they have been predicting a failure. Then they have been publishing all kinds of damaging statements with regard to the trade of the country, and all they wanted was a bad harvest, and then they thought they would ride into power; but the harvest is bountiful. The "grits" will have to wait.

The fact of it is, we can do nothing in the way of change of tariff or political expansion till after the Presidential election. There is no reason why the whole of North America should not be under almost one and the same tariff. Let the United States reduce their duties and taxation to our level, and agree to a similar tariff. If Cleveland gets in perhaps this will be the case; or perhaps he will take a bolder step, and ask for a conference with England for the purpose of framing a tariff for England, Canada, and the United States. If you do not do something over there you will have all your metal trade ruined; already each week brings news of greater and greater depression. You will have to act sometime, and you may as well be up and doing before your trade is entirely ruined by protected counties shutting up their markets and feeding on yours.

Aug. 26. BOURONITE.

COAL AND IRON MINING, COLORADO.

SIR,—The Rocky Mountain region of gold and silver mining is, fortunately, likely to be well furnished with ample resources of coal and iron to supply the rapidly increasing requirements. On the line of the Denver and Rio Grande Railway, between Trinidad and El Moro, there is a large section of mineral country capable of supplying a vast amount of coal, coke, iron, &c., as the subjoined report of Mr. SAM. W. PEASE on a mineral estate will show, and offers a fine field for the profitable investment in coal mining, coke-making, iron smelting, and other industries.

COAL, COKE, IRON, FIRE-CLAY, CLAY BUILDING, AND GRIT-STONE.—The lands consist of about 8680 acres, embracing in its various stratifications all the valuable qualities of very superior coal, iron ore, fire-clay, clay for building purposes, building, and fine grit sandstone: 1680 acres of this land is non-mineral in character, lying in the valley of Las-Animas river, in the mouth of the Raton Pass, and extending in a continuous body from a point about 2 miles north of the City of Trinidad, to a point about 1 mile south-west from the town of El Moro, convenient to the two constructed lines of railroad, and on the line and in the necessary and only gateway through which two projected railways must pass through the mountains to the west and south; thus for the erection of smelting-works and manufacturing establishments and building sites for workmen, &c., securing a valuable possession in the most desirable location. This tract also contains an inexhaustible supply of aluminous earth peculiarly adapted to the making of an excellent article of pressed brick, drain tile, &c. When it is considered that all the pressed bricks used in this region of the county for facing purposes are shipped at enormous expense from the East, and as no earth suitable for the manufacture of these bricks is known to exist north of the Arkansas river it is apparent that this is no mean item of wealth. These lands are all paid for in full and held by a clear chain of title directly from the Government, making a vast mineral estate of more than 8000 acres, in which is stored coal, iron, fire, and common clay, building, and grit sandstone in ample quantity to engage the industry of a large army of workmen for centuries to come.

COAL.—There are three large well-defined veins of coal underlying nearly 6000 acres of the land, each from 6 to 12 ft. thick at the outcrop. It outcrops along the north front of the land at points remarkably easy of access. The veins lay horizontal, and are opened by driving in on them from points where they have been worn away in ravines. No shafting or hoisting being necessary, the mines are perfectly dry, and no foul or damp air exists, as is so common in coal mines in other localities. The lower vein, which is the one worked on adjoining property, has proved to be 10 to 14 ft. thick wherever developed. The several veins consist of a very superior bituminous coal, free from sulphur and other impurities, compact and firm in structure, rich in carbon, and readily convertible into excellent coke. From the numerous veins and wide expanse of territory, will be able to mine coal adapted to every variety of service. The coal is expected to improve as the entries are driven further into the mountain, and the mining is done under great depth of cover. The surface of a large portion of the land rises to an elevation of 1500 ft. to 2500 ft. above the coal level. Under these great elevations the coal must, from the nature of the case, be very firmly compressed, and probably anthracite in character. The theory is, that the tremendous weight of cover has expelled a large percentage of the volatile matter, leaving nearly pure carbon in place. Members of the United States Geological Survey and other scientists have freely endorsed this idea when speaking of the coal in these lands. Speaking of the quality of the coal, Mr. Eilers, a celebrated chemist of the American Institute of Mining Engineers, as a result of experimentation on coal taken from near the surface of the lower vein, found that it yielded 4½ cubic feet of purified gas to the pound of coal without the use of a condenser, 55 per cent. of the coal remaining as coke. Professor Hayden, of the United States Geological Survey, found the result as follows:—

Loss at 111° C, water	0·26
Carbon fixed	65·76
Volatile combustible matter	29·66
Ash	4·32
Total	100·00

Specific gravity, 1·28 to 1·55.

This coal is so easy of access by rail and so cheaply mined that a large saving is derived from those advantages. It is so firm in structure, and wastes so little in transportation and storage, that loss from these causes amounts almost to nothing. To the east and north-east of Trinidad, for a distance of 500 miles, no coal has been found in either Kansas or Nebraska. What the future of the coal trade will be that goes to supply all this vast region is hard to estimate. Professor Wilbur, in his report on the coal of Kansas and Nebraska, says:—There is little to encourage hope of a home supply of fuel. The railroads, as well as the people of these States, must look to the Colorado coal fields largely for their supply of this indispensable article.

COKE.—Only four years have elapsed since the manufacture of coke was first undertaken in Colorado; previous to that time all that class of fuel used by Colorado smelters was shipped at great expense from Pennsylvania under adverse circumstances and solemn predictions of failure. The manufacture of coke was begun with coal taken from lands adjoining these, first with four small ovens of cheap construction. Mark the result. The coal proved so pure, and free from elements objectionable to the smelters, and transformed so readily and perfectly into coke of the very highest standard of excellence that from the very start it was approved. From that time dates a new epoch in the mining industry of the Rocky Mountains; a home supply of smelting fuel, as against the same article of foreign production, with the cost of 1600 miles of railroad transportation, marked a revolution in the expense of smelting. The entire surrounding country has made a grand stride forward; where before a few furnaces were employed for the smelting of selected ores of high grade only, now more than five times the number are kept busy reducing the many thousands of tons medium and low grade ores that were before that excluded from the furnaces on account of the high cost of the proper fuel. This little group of four ovens of four years ago has extended into a line of 250 large and well-constructed ovens, the line being nearly a mile in length, and all the ovens in active operation. And this only the beginning of the mining industry of the Rocky Mountain region. It may be truthfully said that it has scarcely begun. Railroads are fast penetrating the mining districts, new smelting-works are starting up on every hand. The increasing demand for coke will tax the best energies of the producers to supply. Increased facilities must be provided in this coal field. No other coal suitable for the manufacture of first-class coke, such as the smelters require, has been discovered in all the vast extent of country lying between this field and the coal regions of Pennsylvania, nor at any point to the northward in Colorado, Wyoming, Utah, Nevada, or Idaho These States and Territories, all rich in mines, the ores from which must be treated by means of furnaces, must look to this field for their furnace fuel, which they can reach with 1000 to 1200 miles less railroad transportation than from any other source of supply.

IRON.—There are nine well-defined veins of iron ore occurring in the coal measures on this land, some of them so near the coal veins that the ore can be removed at the same time the coal is mined. These veins are from 12 to 30 in. in thickness, and so prominent as to insure millions of tons of ore. The ore is a carbonate, and is known as clay ironstone or kidney iron ore, identical with the carbonate ores found in the coal measures of England and Scotland, and from which two-thirds of all the iron in the United Kingdom of Great Britain is made. From Baneman's Treatise on the Metallurgy of Iron, where he speaks of these ores in Great Britain, he says, the stratas there vary from 5½ to 12 and 15 in. in thickness, and five samples of the ore indicating the character of as many veins, yielded by analysis metallic iron as follows:—29·12; 36·56; 33·20; 35·61; 34·72. The ores of these lands show a higher average percentage of iron, and in thickness of strata more than double that of the British ores. All over the surface of the land is small fragmentary iron ore resulting from the disintegration of the veins where exposed at the outcrop. With unlimited resources of smelting, coal and iron ores existing side by side, there is no question about the possibilities of producing cheap iron. Here is a field inviting the ironmaster to investigate, surrounded by a mineral country unparalleled in the known world for richness and extent, peopled by men of pluck and energy from all parts of the land, to whom is known no such word as failure. Here is a market for iron goods rapidly assuming enormous proportions. New lines of railroad are to be constructed, old rails replaced, miles and miles of iron pipe for leading water is in demand. Many rich mineral discoveries are made remote from water supply. For example, within the past year one company in New Mexico laid water pipes for its own use one which the freight alone amounted to $65,000. During the year 1881 there was imported into Colorado alone 103,000 tons of iron goods, or on an average of more than 280 tons per day for every day of the year. All this was shipped from points from 1000 to 1500 miles distant.

FIRE-CLAY.—This indispensable material exists in these lands in great variety, both nodular and stratified, and is found in well-defined veins of ample thickness for economy of mining, in most cases coming in contact with coal and iron in such a way that it may be readily mined with either of those minerals. There is no doubt but that the great extent and variety of clays will supply material suited to every class of furnace and coke-oven linings. In the manufacture of fire-bricks alone a promising field presented itself. Numbers of the furnaces and coking ovens already in blast bring their fire-brick from points so remote that in most cases the item of freight exceeds the original cost of the brick.

BUILDING STONE.—Several hundred acres of the main body of these lands is outside the coal belt. Here is found a beautiful sandstone, exposed on either side of several ravines, of a thickness of 30 to 50 ft. Large areas are overlaid with but a few feet of soil. Here Nature has accomplished much to facilitate the handling of this material cheaply. The abundant water supply belonging to this property can here be made to play an important part in the way of hydraulic works in washing away debris, and sawing the stone into shape. Stone from these strata when taken out have been found to work easily when first quarried, and to harden by exposure. The only limits to the size of the stones possible to get out and work will be the limit of the means of handling large masses. It is entirely free from iron and other impurities of uniform bluish grey tint, superior for building purposes to any other building stone found in the north-west, and not excelled anywhere for ease of working when first quaried, and firmness and toughness when seasoned.

GRITSTONE.—Lying immediately in connection with the building stone is found a large strata of most excellent fine grit sandstone, with a sharpness of grit, which makes it superior for grindstone, whetstones, &c.

WATER.—Attention is here called to a feature of incalculable value. High up on the mountain slope break forth numerous never-failing springs of pure water. These all flow into one valley, forming Grey Creek, a rapid rushing mountain stream, sufficient in volume to supply water-power for all needful operating machinery and domestic purposes. The bulk of the water reaches the channel of the creek at a point more than 1000 ft. above the level of the main big coal vein, taken from this point, and conveyed in pipes; it is sufficient in volume at all times to maintain 200-horse power. This can be economically employed to compress air to drive coal mining machinery, to grind clay, saw stone, &c. After performing daily labour equal to many hundred men, it is also at hand to drench the coke-ovens, and supply the domestic wants of the workmen and their families. In that part of the country where the rainfall is scant, and running water the exception, the value of a constant and abundant supply of pure water will be readily understood. In carrying on mining on other properties in the neighbourhood large sums of money are expended yearly to provide water—that indispensable article which Nature here furnishes in overflowing abundance.

TIMBER.—While the greater part of these lands are not timbered, still on the higher parts of the property many large groves of spruce pine are found; sufficient timber can be obtained here to meet the requirements for many years to come. Railroad ties can be obtained from this source to construct all necessary railroad connections, sidings, &c. Of all the smaller timber suitable for timbering mines, making coal props, and tramway ties there is an abundant supply.

PASTURAGE.—Over a large portion of the ground is a luxuriant growth of nutritious grass, affording abundant pasturage for the necessary animals, as well as cows belonging to the employers.

DEMAND FOR THE PRODUCTS.—The rapid and substantial growth of Colorado, especially in the mining industries, the numerous long line of railroads which must continue to draw their fuel supply from the base of the Rocky Mountains, the numerous and increasing number of smelters, which consume large quantities of coke, the heavy iron machinery and water pipes required at the gold and silver mines, and the iron rails required by the railroads, all unite to make a demand for coal, coke, iron, and fire-clay, which is already large. The mining industry of the State, especially of the southern half of it, as also of northern New Mexico (all tributary to this field) is yet in its infancy. Already the Colorado Coal and Iron Company's Mine, which is situate about two miles north-west from this property, is putting out an average of 1200 tons of coal per day, which does not near supply the demand (1882). The same company has a line of 250 coke-ovens in operation, but is unable to supply more than about one-half of the present (1882) demand for that article, the balance of the coke required being shipped from Pennsylvania, a distance of about 1500 miles: 2500 miles of railroad was in active operation in 1882 in Colorado, and extensions and new roads are being rapidly constructed. Cities and towns of substantial build, and ranging from 3000 to 10,000 inhabitants are numerous. Denver, the marvel of this age of marvels in its rapid growth, is now a city or about 100,000 busy and prosperous people, with over 13 distinct constructed railways centreing there. But Denver is only one of the many, and only tends to show what the mighty future of the State of Colorado is destined to become, and the immense field already opened up for the products of this valuable property.

PROFITS.—The total cost of mining the coal is estimated at from 50 to 62½ cents per ton; this includes the cost of taking out the coal, interest on investment, and wear and tear of mining utensils, cars, tramways, weighers, and superintendent's salary; in short, everything connected with mining the coal. All the coal not made into coke is sold at the rate of $1·50 per ton at the mine, leaving a minimum net profit of 87½ cents on each ton of coal mined. This profit to a mine putting out 1000 tons per day will amount to $875 per day, or the snug sum of $262,500 per year of 300 days net profits over and above everything for coal alone. Intelligent coal men and coke-makers estimate that with the superior advantages of this property coke can be made at a maximum cost of $1·50 per ton; but even should it cost $2 per ton—which would be extravagant—250 ovens will produce an average of 1¼ ton per day to each oven, or a total of 312½ tons per day. Estimating the net profit at $3 per ton—which is very much below the fact—and the net profit on coke alone would be over $280,000 per year of 300 working days, and the profit on both coal and coke over $500,000 per year. What might not be done with sufficient capital to utilise all the various material to be found on this property? When it is considered that the profits on the manufacture of iron and fire-brick is about equal to that of mining coal and manufacturing coke, it will not be difficult for any intelligent person to estimate approximately the immense profits which can be made from this property when properly developed.

TRANSPORTATION.—Assurances have been given by the various railroads that all facilities for handling both coal and coke supplying cars, &c., will be freely rendered, and that all will be done on their part necessary to put these materials on a fair basis as to rates, &c.

FINALLY.—All statements herein made as facts will be freely guaranteed by the owners, who are ready and willing that a free and full examination of this property shall be the test of the truth of the matter herein stated. THOMAS CORNISH, M.E.

NEW DEFINITION OF MINERAL VEINS.

SIR,—Were this vexed and long-agitated question ever to be solved at all, is it not likely that it would have been solved last week at Montreal, where all the wisdom and knowledge of both the hemispheres seem to have been concentrated? But solved it was not, only further discussed and agitated, the profundity of the question appears to surpass the intellectual capacity of the cluster of scientists there assembled, for the question was asked, "What is a mineral vein or lode?" Here the matter seems to have rested, and darkness to have shrouded the scene until illuminated by Dr. C. Le Neve Foster. In order to afford this illumination, the doctor calls to his aid no fewer than eight German geologists, "who, in common with most geologists, have looked upon mineral veins as the contents of fissures." But, "while admitting that a very large number of veins may be so described," the author—Dr. Foster—"contended that the exceptions are sufficiently important and numerous to warrant a change in the definition. He is of opinion that many of the principal and most productive tin lodes of Cornwall are simply tabular masses of altered granite adjacent to fissures." This is a new and an additional theory—quite a new doctrine—which, perhaps, we may be allowed to call the granitic. In conclusion, he proposed the following definition:—"A mineral vein or lode is a tabular mineral mass formed more or less entirely, subsequently, to the enclosing rocks." Thus is the whole matter summarily summed up, disposed of, and settled—wrapped in a nutshell. This summary conclusion may do very well for some, but I, as an individual, am at a loss to conceive what "tabular" has to do with the structure of a metallic or of any other mineral vein, and equally am I at a loss to conceive, or to believe, that different processes were adopted in their respective formation. But the strangest and most inconceivable matter of the whole is that the barren granite rock known to contain no kind of metallic substance, and only fit for building purposes, should be turned into the ore of tin. This were a metamorphosis such as Ovid never even dreamed of.

But, to revert to the fissures or chasms; metallic veins, as well as all other mineral veins, vary in width from a few inches to that of 10, 20, 30, 40, and more feet, and perilous must have been the period when such fissures lay open ere they became filled. Woe to the belated traveller, or the horse and rider who should or might have unhappily and suddenly been precipitated into them. Probably I

shall be told that this was in the palæontological age (as to time mentioned when mineral veins were formed it must be understood that I allude solely to metallic veins) before either traveller or rider existed. Be that as it may, the experienced miner who lays open the interior of the earth witnesses sufficient phenomena to convince him that no such thing ever existed. I will mention but one. For example—there are two veins with an "underlie" or inclination in opposite directions, but near each other; say, the one inclines towards the north the other towards the south, it is evident, then, that in depth the two will unite; their fissures also must have united before they were filled. This evidently formed a triangle in the shape of a V. By what, then, or to what was suspended the fragment of the world which lay between the two fissures, or that within the V? Many a poor unfortunate miner has lost his life by extracting the united veins from under the bottom of the V, which is technically called the "point of the horse." Here the strongest and stoutest timber has to be used, so as to prevent the whole mass from falling when the veins are being extracted at the bottom of the V, or the point of junction of the two veins. But when I mention the absurdity of the fissure theory in the way which I describe, I am told that in reality it is not meant that they were ever open fissures; that it was only by a certain chemical process that the valueless matter was removed in order to give place to that which was valuable. Then I say that in that case there was no fissure at all—*London, Sept.* 10. JOHN LEAN.

WEST COAST (GOLD COAST) OF AFRICA.

SIR,—During the last few years several companies have been formed and large amounts of capital subscribed to work various gold properties on the above coast. That there exist large paying quantities of gold in the properties the most satisfactory evidence offered is never contradicted. The question remains—What is being done, as the shareholders generally are neither informed or taken into counsel? If through bad management at home or abroad, sure the shareholders might be kept advised of the state of the property, thereby instil confidence and possibly bring influence to bear, and where deserving to assist in raising capital when required for fully developing their respective properties. It is not a question as to the resources of rich gold-bearing quartz in paying quantities that is to be had there by good management. If you can spare space in your valuable columns to insert this with a view of fully developing these properties you will confer a lasting benefit on some hundreds of your constant readers.—*London, Aug.* 10. E. W.

KAPANGA MINE, NEW ZEALAND.

SIR,—I have just received, as a shareholder, the balance-sheet to August, 1884, which shows the expenditure to be from June, 1883, to July of the present year 8214*l.* 11s., whilst the gold produced realised 1636*l.* 10s. 5d.; leaving a working loss of 6578*l.* 0s. 7d., to which must be added directors' fees, office expenses, &c., 849*l.* 15s., raising the total loss to 7427*l.* 15s. 7d. In last balance-sheet the office expenses were put down at the modest sum of 1895*l.* 15s. 2d. In the hands of Capt. Argall and the bank there is in cash 2348*l.* 0s. 2d. The late scheme of issuing the shares at 17s. 6d. discount appears to have caused 60,319 shares to be taken up, which should equal 7539*l.* 10s. as realised.

Now the question is are the shareholders satisfied with the management in London. Adverting to passed mismanagement of the mine and the depression overhanging all mining ventures generally through the disgraceful part played by promoters and the high fees paid to directors, is it not consistent while we have the mine to cut down the expenses and to ask the directors to repay the fees handed to them the past year, which I presume amounts to the no inconsiderable sum of 849*l.* 5s., paid for office expenses, &c. If Capt. Argall wants 4500*l.*, and he has 964*l.* 15s. 7d. only in hand now, he will want another 3500*l.* In the bank there is 1393*l.*, deduct office expenses for a year (say) unless modified 849*l.* = 544*l.* only left towards the 3500*l.*—wanted as stated in report. Surely in the face of these facts the shareholders should at once infuse new blood into the concern

Portsmouth, Sept. 10. SHAREHOLDER.

THE BUCKFASTLEIGH DISTRICT.

SIR,—The prospects of mining in this neighbourhood are, to say the least, most encouraging. I am creditably informed that the next sampling at Brookwood will be about 300 tons. Surely this looks well, especially for the number of hands employed. The underground developments, particularly eastward, have proved to be most satisfactory; in some parts the lodes have been worth from 25*l.* to 50*l.* per fathom. In going over the ground I find those courses of copper ore are traversing the whole length of the adjoining mine—known by the name of New Brookwood. Here I found a capital horse-whim, and other necessary appliances, in full working trim, now applied in drawing out the water and stuff from the engine-shaft, said to be down about 16 fathoms here. I would remark great credit is due to the captain, who has done his work in a thoroughly miner-like manner. The stuff on the burrows is highly mineralised, showing unmistakeable evidences that they are not far distant from a course of ore. There is no second opinion as to the value of this virgin mine, which only requires a moderate outlay to enable the proprietors to produce hundreds of thousands of pounds worth of ore.—*Sept.* 11. WILLIAM THOMAS.

NEW METHOD OF UTILISING SLACK.

SIR,—When in the United States last summer my attention was called to a somewhat ingenious form of reverberatory furnace, and a general description of it may be of interest to some of your readers. It is not my intention to take up your valuable space with dimensions, the principles involved in the construction of this furnace being of varied applicability. The furnace I saw was at that time being used for the production of rich masses from auriferous and argentiferous copper and iron pyrites. Instead of the usual arrangement of fire-place, this furnace is provided with three cast-iron semi-cylindrical coking retorts or tubes open at both ends, although the charging and external end is fitted with a door. These tubes are firmly built into the end wall of the furnace, being also supported at their ends nearest the hearth in substantial masonry, and are high enough above the floor of the building to allow of convenient charging on the part of the fireman. Immediately below these tubes are a quantity of fire-brick so stacked as to permit of a free passage of the waste heat and gases, at the same time accumulating the heat and maintaining the coking tubes at an even temperature. Passing on toward the hearth there is in front of these tubes a fire-place provided with bars arranged on the step-grate method. The hearth does not need description here, its nature always depending on the purpose for which the furnace is required.

Such is the arrangement of the flues that the dust, fumes, and waste heat are conducted under the furnace hearth, where a portion of the suspended solids accumulate; what does not settle here passes with the waste heat through the stacked up fire-brick, around the coking tubes into a flue built on to the side of the furnace, thence into the stack which is furthest from the fire-place end of the furnace. The top of this last mentioned flue is on a level with the top of the roof of the furnace, and can be utilised for the preliminary thorough drying of ore when it is required. In operating the furnace the fuel, which may consist either entirely of bituminous coal, slack, or of a mixture of it with other carbonaceous matter, is charged into the coking tubes at such a rate that by the time it is thoroughly coked it has reached the interior end of the tubes. It is then pushed forward, the coke containing nearly all the fixed carbon of the fuel burns on the step-grate. By this means there is a constant stream of slack passing through the tubes being converted into coke, and the volatile products being utilised to the greatest possible advantage, being burned immediately upon production, and not accumulating in the form of tar, &c., as in some arrangements I have seen for the utilisation of slack. In some cases it may pay to allow such products to accumulate, but in this arrangement such is not intended, all the heat-giving elements in the fuel being at once utilised.

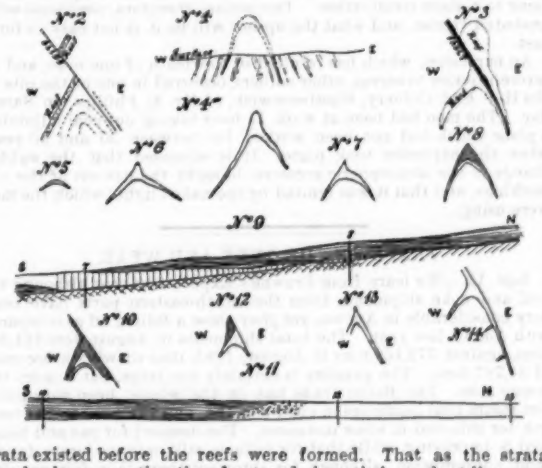
It was gratifying to see the waste heat so used for assisting in maintaining the temperature of the hearth, and also for coking and ore drying, to say nothing of the saving of the fumes, after having so often seen both so recklessly poured into the atmosphere. After careful enquiry, not only of employees but of residents in the camp whom I could safely regard as disinterested, I was repeatedly informed that the furnace had for several weeks been running without interruption, save for the usual repairing of the hearth, and was doing the same work on a consumption of 4 tons of slack as the older forms in use in the same works were doing with 7 tons of ordinary coal. Whether this be true or no, I am quite agreed with others who have seen this furnace that it merits the careful attention of metallurgists everywhere, if not also of civil and mechanical engineers, and all persons interested in rendering available so cheap a fuel as slack. HERBERT STRICKLAND,

Abchurch Chambers, E.C. ——— Mem. Am. Inst. M.E., &c.

THE GOLDEN QUARTZ REEFS OF AUSTRALIA.—No. IV.

SIR,—Garden Gully Reef.—The first mining operations on the outcrop of this reef, unlike those carried out on the Hustler's Reef, yielded such small returns of gold that energetic mining was discouraged, and a couple of years after its first working the whole line of reef bearing this name was abandoned. This was in a measure also partly due to the smallness of the reef cropping up to the surface, and to the comparative hardness of the bounding rocks. The reef as left by the first miners, worked up to the surface, was only from 6 to 9 in. in thickness, and not calculated, therefore, to attract much attention. At this period of inactivity, beginning in 1859, I got down into these old workings and examined the reef, which did not offer any encouragement to prospectors or investors to give it a new trial, judged from its appearance as exposed to view at that time. Before I proceed further in my description of this reef I must mention that in its extension to the north it is known as the Perseverance, Windmill Hill, Johnson's, Eagle, and Moon. These several names were given in the early days when the forest covered the country, and prevented the pioneers obtaining an unobstructed view from hill to hill, and of connecting the quartz reefs cropping out on them as one continuous line.

Strata.—The Garden Gully Reef occurs in an anticlinal fold of the strata running approximately parallel to the Hustler's Reef anticlinal. There is, however, a considerable difference between these two anticlinals; the latter is but little disturbed as compared with the former, which is fractured and faulted in its apex and legs in a marked manner. The Garden Gully anticlinal has a tendency to lean over to the west. The numerous faults in it are almost without exception longitudinal ones, and for the most part exist through the fracture and displacement of the western portion of the anticlinal, the strata on the eastern side not being faulted but merely sliding one over the other in the line of fault, somewhat in this manner (No. 2). It is possible that these fault or slide lines in the



strata existed before the reefs were formed. That as the strata was slowly corrugating they fractured along their weakest lines, and that the faults gradually or more quickly increased in extent as adjustment became necessary under unequal pressure. The two operations may have simultaneously progressed—of faulting and of reef construction. The movement in the strata appears to have been an upward one of that portion overlying the fault or "slide," as it is more commonly called in Australia, for example (No. 3). No. 3 section illustrates another fault in the Garden Gully Reef.

Reefs.—The reefs have usually more of the inverted V shape (∧) than of the crescent or inverted U (∩), although there are examples of the latter. These broken saddle, or ∧, reefs occur one beneath the other, quite independently of one another (just as do those of the Hustler's Reef), and in keeping with the anticlinal of the strata the reefs are found successively one below the other, the cap or saddle of each from the surface downwards occuring more and more towards the east. As a rule, on Bendigo the shafts are vertical, and in consequence of what I have just stated the shafts on the Garden Gully are proved to be—as greater depth is attained—on the western side of the "centre country" or anticlinal in which the saddle reefs occur. From the deep shafts cross-cuts are driven to the east to cut and prospect the "centre country" for payable auriferous reefs. In the Garden Gully Reef there is a "crown formation" (as well as in the Hustler's Reef), the several reefs to the south of which having a gentle dip to the south, and those to the north of it dipping north. The first claims worked on the Garden Gully Reef were situated on this "crown formation," and, as I have said, the surface reef was poor, and the reef to the north and south of the "crown" after being prospected was abandoned, and a quarter of a mile of land to the north, a mile, or rather miles, to the south remained unoccupied; this line of reef at the time being considered an outside line, completely eclipsed by the rich surface reefs on the Hustler's, New Chum, and Victoria, and numerous other reefs. Yet in ten years later the whole of this land was occupied, and the stock of less than 20 public companies was valued at 1,324,000*l.* The "crown" on the Garden Gully Reef happened to be in a gully, the surface outcrops merely showed the ends of the legs as they tailed out in depth, the upper portions and the saddle having been swept away by Nature's sluicing operations. It can, then, be readily understood why prospecting by sinking on the legs of a reef that were pinching out did not result in encouragement for further outlay of capital. This top reef was, judging from surface indications and the legs of the reef left *in situ*, of small dimensions, much the same as that here depicted (No. 4, 4a) beneath the surface line—named Ladam's Reef, which was discovered and worked in Ladam and Co.'s claim. Ladam's Reef was found about 100 ft. beneath the surface, was about 10 ft. wide across the saddle, and its eastern leg was payable for 40 ft. in depth; portions of the upper part of this reef yielding 4 and 5 ozs. to the ton of quartz. In the sketch section No. 4 I have indicated by dotted lines the saddle reef of which there remained only the thin ends of its eastern and western legs to be worked by man. Where saddle-formed reefs occur it may be inferred if an eastern underlying reef is found that to the west of it will in all probability be discovered a western underlying reef, or, at least, the track of it. Should such east and west legs or reefs be found, or even their tracks only, the prospecting work is not in vain, for the centre country is proved, and the position where best to sink a vertical shaft to find the next saddle reef below is indicated. In many mines on Bendigo I have seen incipient saddle reefs with legs not more than 2 or 3 ft. in length and the saddles as many inches across. Large saddle reefs sometimes die out to such dimensions in their continuations north or south. At the southern end of the Garden Gully Reef, for instance, the incipient reef beginning thus (No. 5); at 180 ft. north it has increased to (No. 6); at 160 ft. still further north it is thus (No. 7); and at 180 ft. still northwards it is again on the wane like this (No. 8); and the longitudinal section between these last two points is thus (No. 9). The figures 7 and 8 in this section represent the positions of cross-sections 7 and 8 above. The horizontal lines in cross-section 8 and in the section represent "black slate taking the place of quartz" in the saddle of the reef. The words in inverted commas are those inserted in the original section by Mr. Caleb Thomas, mining surveyor, where I have drawn horizontal lines. Here let me take the opportunity of acknowledging the assistance I have frequently received from this gentleman's and Mr. Mining Surveyor Walker's admirable plans and sections compiled from their own surveys. The words I have above quoted almost lead me to remark on their connection with the growth of quartz reefs; my views on which subject you have, however, published, and I will spare your readers as far as I can do so from theoretical ideas, in what I wish to be pure descriptions of auriferous quartz reefs, allowing those who read to draw their own conclusion from the facts I supply from their several experiences of reefs, veins, or lodes in other countries. The eastern leg has been the main one worked at the southern end of this Garden Gully Reef, and the western leg the most important at the north end; the opposite legs in each case being short, and of no consequence. At 400 ft. to the north of the section No. 9 this reef occurs in this fashion (No. 10) the whole of the saddle, as shown by horizontal lines consisting of slate, whilst beneath it occurs, as shown in the sketch, a saddle-formed branching spur of quartz. This spur eventually further north cuts out the slate to balance matters, and as to the south I have shown the slate cuts out the quartz. Mining men usually talk of such changes as the one body cutting out the other, and it is clearly understood what is meant to be conveyed. But I submit that it is possible this is the boundary of transmutation from slate into quartz, where this cutting out or transformation takes place. This section is a longitudinal one (No. 11) beginning to the south at No. 10 cross-section, where there is a saddle of slate which becomes a quartz saddle, 12, at which point the transverse, or cross-section, is like this (No. 12), and at 13 like this (No. 13). In section No. 11 under the saddle to the north there are certain curved lines which show the stoping done on the eastern leg; this stands good also in the case of section No. 9, and those in the latter curved in the opposite direction mean stoping done on the western leg. I may also mention all cross-sections are depicted as seen looking north, and that these remarks will stand good for all sections that may follow unless otherwise stated.

Proceeding further north the saddle again undergoes a transformation, breaking up into slate with quartz saddle, spurs, and then sandstone predominates. Meantime the eastern leg increases in size and richness, and is stoped for 170 ft. on its underlie, the saddle not paying to stope. Before going further I should say that the dip of the top of the saddle which is shown in section 11 as dipping north is exceptional, and only continues a short distance beyond cross-section 13 before it takes the usual southerly dip on the south side of the "crown formation." I have said the saddle did not pay to stope, and should have added for from 700 to 800 ft. in length to the north, and this remark applies also to the western leg, which becomes payable again to the north, just where the saddle pays to stope. Now, from the eastern leg dropping spurs branch off into the footwall at nearly right angles with the leg. The junction point of these droppers with the leg rises upwards as followed to the north, the strata forming the footwall country of the leg, underlying parallel with the leg. This cross-section will give an idea of the form of the reef (No. 14). Here the saddle for nearly 400 ft. has in a great measure been stoped, and thence for 700 ft. further north only a small part of it induced stoping, and then for over 1500 ft. the whole of the saddle and east leg have been excavated. The eastern leg in section 14 was stoped for 300 ft. in depth below the saddle; but as it was followed north it shortened, the saddle again became payable and the works are overlapped by mining on the top saddle, or Ladam's Reef. Here Ladam's Reef for over 500 ft. in length merely consisted of a small saddle without legs, or only apologies for legs, not worthy of notice. The reef we have thus far followed up from the south is called at this place the Middle Reef, because it comes in between the top, or Ladam's Reef, and the Pandora Reef. The relative depths from the surface of each reef is—top reef (Ladam's), 131 ft.; Middle Reef, 383 ft.; and the Pandora Reef about 700 ft. These measurements in each case from surface to the bottom or under part of the saddle. We have now reached to the southern end of the rich Garden Gully United Mine, in which for nearly 1900 ft. in length the three reefs have been, and are now, in work with very profitable results, which I shall refer to under gold. The saddle of the Pandora Reef was worked at the time of my last visit for 40 ft. in width, and opened for 600 ft. in length, the whole of the quartz from all parts of the mine yielding over 1 oz. of gold to the ton. The quartz in the saddle was marble white and of a splintery nature, dividing longitudinally with the course of the reef. It gave me the impression that its splintery character was due to immense vertical pressure, to which it had a disposition to divide or split at right angles.—*Melbourne, July* 24. WM. NICHOLAS, F.G.S.

Consulting Mining Engineer.

HULL, BARNSLEY, AND WEST RIDING JUNCTION RAILWAY AND DOCK COMPANY.

SIR,—The engulphed state of this undertaking already pourtrayed requires no supplementary matter on my part. A company is provisionally formed for the purchase, transport, and vend of Yorkshire coal in London and Paris, with a capital of 5,000,000*l.* For the advertising of same 5000*l.* is assured. This company is prepared to negociate for the lease of the railway and dock, having more coal to ship at Hull than the line can convey. Before any negociation can be entered upon all idea of connection with a powerful Midland Railway must be banished, as shipment of coal *via* Hull to London will displace all rail-borne coal traffic to London.

The great question now at issue must be decided by the shareholders, as it appears Colonel Smith, the Chairman, has placed everything in the hands of a late old servant of the Midland, and recently of the Great Eastern, and of the Chairman of several railways. Now it is well known the railway interest is as much opposed to seaborne coal traffic as can be imagined. The coalowners of Yorkshire are deeply concerned, and it is of the utmost importance that a meeting be arranged in London to discuss this matter, as by the proposed company house and steam coal can be delivered in London and Paris at many shillings under what is possible by railway, or as proposed by Hull steamship owners by sea, the coal company paying at pit-mouth a higher price for whole outputs than has existed for many years. The Hull shareholders must be fully aware that not an ounce of coal will be shipped *via* Hull for London, if, as I am informed, their undertaking is drifting into the hands of a large coal carrying railway company to London. It is madness to imagine the public will subscribe a penny to any proposal unaccompanied with a certainty of coal traffic, for which the line was intended. Other traffic is an utter delusion as far as a satisfactory dividend.

Little Tower-street, Sept. 12. W. J. THOMPSON.

IRON AND STEEL INSTITUTE.—The first half-year's volome of the Journal of the Iron and Steel Institute has just been issued through Messrs. Spon, of Charing Cross, and will be alike acceptable to members and non-members as a record of the technical progress being made in the trades represented. The report of the Council for 1883 and accounts of how the Davison fund and Bessemer medals had been disposed of, are followed by the various papers read and the discussions upon them. The titles of the papers are—"On the Use of Raw Coal in the Blast-Furnace," by Mr. I. Lowthian Bell, F.R.S.; "On Gas Puddling and Heating Furnaces, with special reference to the Casson-Bicheroux system," by Mr. R. Smith-Casson; "On the most Recent Results obtained in the Application and Utilisation of Gaseous Fuel," by Mr. W. S. Sutherland; "On Iron and Steel Permanent Way," by Mr. Walter R. Browne; "On the Behaviour of Armour of Different Kinds under Fire," by Capt. C. Orde-Browne; "On Recent Improvements in Iron and Steel Shipbuilding," by Mr. William John; and "On Improvements in Apparatus for Gas Analysis," by Mr. J. E. Stead. There are the usual notes on the progress of the home and foreign iron and steel industries. The volume is, as usual, admirably and carefully edited and an enormous amount of useful information is compressed into it.

FOREIGN MINING AND METALLURGY.

The Belgian Coal Trade has not exhibited much change; house-hold coal has, however, shown a tendency to firmness. The production of coal in the Hainaut last year is officially returned at 13,497,113 tons, as compared with 13,131,342 tons in 1882. The average annual production per man employed remained the same in each year—170 tons. The value of the coal raised declined to 5,140,143*l.* in 1883, as compared with 5,311,944*l.* in 1882. The number of mines which were worked at a profit in the province in 1883 was 44, but 40 were worked at a loss. The general result of last year's operations was a profit of 154,796*l.* The production of coal in the Pas de Calais last year was 6,150,801 tons, as compared with 5,706,390 tons in 1882, and 5,320,390 tons in 1881. As regards the current year, stocks have shown a tendency to increase in the Pas de Calais, and some of the mines have recently been working only five days per week. Of the production of last year 470,993 tons were consumed by the mines themselves, and 5,665,362 tons were either sold in the Pas de Calais (1,202,208 tons) or were forwarded to other French departments or sent abroad. The coal trade appears to be improving in Germany. The demand is larger, and a good winter season is generally anticipated. Prices have shown a tendency to improve. The exports of coal from Germany in the first half of this year were 4,081,923 tons, as compared with 3,995,642 tons in the corresponding period of 1883.

The Belgian Iron Trade has remained in much the same state as for some time past. There would not be much complaint if apprehensions were not entertained that orders will fall off as the winter comes on. Meanwhile Belgian firms have obtained some rather important contracts for plant from the Panama Canal Company. Thus the Baume-Marpent Works have received an order for 200 trucks at 71*l.* each, the Braine-le-Comte Works an order for 200 trucks at 78*l.* each, the Nealines Works an order for 200 trucks at 85*l.* each, and the La Croyère Works an order for 200 trucks at 85*l.* 12s. each. Corresponding orders have been given to French works as follows:—Bonnefonds Works 175 trucks at 74*l.* 16s. each, Desouches Works 175 trucks at 75*l.* each, Bechade Works 175 truck at 83*l.* 3s. 4d. each, and Fourchambault Works 175 trucks at 86*l.* 15s. 2d. each. The John Cockerill Company has received an order for 15 locomotives for Panama. No. 1 iron has remained at about its old level upon the Belgian markets—4*l.* 10s. per ton for export and 4*l.* 12s. per ton for home consumption. The production of pig in the Hainaut last year is officially returned at 424,873 tons, as compared with 402,138 tons in 1882, 356,954 tons in 1881, and 347,835 tons in 1880. The production of iron in the Hainaut last year was 343,747 tons, or 17,434 tons less than in 1882.

The intelligence received from the French iron districts does not present much interest. Prices have been maintained at their former level, but they have not shown much firmness. Iron has not made more than 6*l.* per ton as a general rule, although producers have endeavoured to maintain a quotation of 6*l.* 4s. per ton. With the approach of the dead season, it is also nearly certain for the rest that quotations will continue to fall. With reference to the progress of metallurgy in the Pas de Calais, it may be observed that the Outreau and Marquise blast-furnaces produced last year 46,151 tons of pig. The Steelworks of France at Isbèrgues produced last year 33,165 tons of Bessemer steel rails. The aspect of metallurgical affairs in Westphalia is regarded as rather more satisfactory; at any rate, the pig-iron market has exhibited rather more animation. Iron is still in no great demand in Westphalia, but the steelworks have their order-books well filled. In the first half of this year pig was exported from Germany to the extent of 115,588 tons, iron to the extent of 79,293 tons, rails to the extent of 64,784 tons, plates to the extent of 23,372 tons, and wire to the extent of 104,584 tons. The imports of rails into Germany in the first half of this year were only 353 tons.

ITALIAN MINES.—Referring to the trade and commerce of the province of Cagliari during last year, Consul Pernis states that the production of the mines amounted to 16,107,783 lire as against 14,434,855 lire in 1882, being an increase of 1,672,928 lire. If the production went so high as that it is due to the concours of the zinc production, representing the value of 6,032,889 lire 54 c., and to that of the silver, amounting to 1,673,975 lire. The lead production, on account of the competition of Spain and America, is always diminishing, and it is the general opinion here that this industry will never get up again until the proposed import duty on lead will be imposed—a question which has for some time been laid before Parliament, but not yet defined, being under examination yet of the committee charged with the revision of the customs tariff. In the 56 mines that have given the above-mentioned total produce have worked 10,958 persons, of which 9369 were adult males and 592 boys under 14 years of age, and 638 adult females and 359 girls under 14 years.

REPORT FROM CORNWALL.

Sept. 11.—Opinions, perhaps naturally, still differ and differ widely as to the probable course of the tin market. There are a few prophets of lower prices still, but they are not many, and yet more are inclined to take the most sanguine view of the immediate future. Without, however, seeming to expect too much, not merely an advance but a series of advances seems probable, and is casting its shadow before. There are still some puzzling features in the statistics quoted: but they are interpreting themselves in the right direction; and as to the attempted Dakota scare that seems already on the high road to oblivion. The statements made, as we pointed out, was absurd on the very face of them.

The proposal to turn Camborne Vean into a Limited Liability concern, whether combined or not with the suggested extension of the sett on the Dolcoath side by purchase, once more brings to the front the question of the applicability of the Limited Liability system to the conditions of Cornish mining. So far, as we all know, its introduction has been a complete failure, for the rare exceptions are only sufficient to prove the rule. We are quite ready to admit that in the immense majority of cases Limited Liability has not had fair play; but has been weighted by exterior influences. It is equally certain that Camborne Vean is a capital mine for the trial of the experiment upon the best lines. Perhaps, therefore, the problem may be solved at length; but we confess to not being over sanguine. Very much depends upon the way in which the new venture is launched.

The probable fate of Wheal Jane reopens the old question as to the relations of adventurers and lords. If Lord Falmouth, or his agents, whoever may really be responsible, insist upon exacting the full terms which they now demand the mine must be stopped. For year after year now Wheal Jane has been worked purely for the benefit of the lords, and the adventurers have had to pay over 3000*l.* in dues for the privilege of losing 30,000*l.* in cash. The mere statement of such a state of things as this is sufficient to prove its outrageous absurdity. The rights of the question now at issue may be tested in a very simple way. What would Lord Falmouth do if he were working the mine on his own account? We have no hesitation in saying that he would do exactly what the adventurers now propose. It is often said that the interests of both parties are identical. If so, here is an opportunity of proof. No doubt they ought to be; but clearly as the matter now stands Lord Falmouth has all profits and no risks, and seems content to allow things to remain on that basis. But surely it cannot be right to force people to do what you would not do yourself, while of all policies none can be more short-sighted.

We give the actual text of Mr. Bolitho's decision in the Dolcoath rating case:—"1. My decision will be based on the position and prospects of the mine at the date of the assessment being made.—2. I do not take into consideration any agreement made with the lord.—3. I am guided solely by the 7th clause of the Act, 1874, which says—'That a mine let partly on fine, on premium, and partly on dues, shall be assessed at what the mine might reasonably be expected to let for.'—4. Having been furnished by the managing agent with all possible information as to the condition and prospects of the mine, I come to the conclusion that a reasonable rent would be 1-15th dues, adding thereto 7½ per cent., making for the year 1884 7288*l.* 10s (Signed), THOS. S. BOLITHO." As we have already said, we fail to see how this binds anybody but Dolcoath. Probably the matter will rest here, but it can be reopened again by the rating authority on any new rate, and, indeed, they can be forced into taking action. That is why we preferred a direct legal decision, which need not have been much costlier than arbitration if taken by consent.

REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

Sept. 11.—The coal market is strengthened this week by the failure of the attempt to bring about a settlement of the collieries strike, referred to below. Consumers, however, do not appreciate having to continue to pay the firmer rates now prevailing, unless they can gain a compensating advantage in their prices for iron. To the Cannock Chase coalowners the prolonged struggle is proving a source of considerable wealth. It is making them active at a time of the year when ordinarily they have only little to do. Those small collieries in South Staffordshire, too, where the men are working at the old rate, are glad that the opportunity still continues of making money without being troubled with severe competition from their neighbours. Furnace coal is 10s. to 9s. 6d. per ton; good forge, 6s. 6d. to 6s.; and ordinary, 5s. 9d. to 5s. 6d. per ton. Slack is fetching relatively better prices than coal, especially upon Cannock Chase. The improvement in the pig-iron trade is unabated. Sales of common sorts made outside this district are still considerable. The contracts are mostly from three to six months forward. Some brands are up 3s. per ton on three weeks back, making Derbyshires 43s. per ton at stations, or 44s. per ton at works. Certain Northampton vendors are very confident that in three or four weeks more they will be getting 45s. or 46s. per ton, native pig makers, however, much doubt this, though they would welcome such an advance consequent upon the reflex influence it would have upon their own prices. These are—All-mines hot-blast, 57s. 6d. to 56s. 3d.; part-mines, 42s. 6d.; cinder pigs, 40s. to 37s. 6d. Manufactured iron does not show much improvement, still the tendency is in that direction. Sheet makers are asking more money. Common bars are 6*l.*; common hoops, 6*l.* 5s.; tank-plates, 7*l.* to 7*l.* 10s.; boiler-plates, 8*l.* to 8*l.* 10s.; and nail and gas tube strip, 5*l.* 15s. per ton upwards.

On Tuesday at the Council House, Birmingham, a meeting of what was termed a Court of Appeal was held with the object if possible of arranging a mutual settlement of the colliers' strike, which has now lasted 10 weeks. The Court consisted of five gentlemen whose names had been agreed to by representative masters and men alike, and who had been asked to attempt a settlement by Councillor Granger, of Birmingham. When the Court met, however, under the Presidency of the Mayor, Alderman Cook, it was found that both employers and employed had at representatives meetings held since the appointment of the Court imposed impossible conditions, and the matter did not, therefore, proceed to arbitration. The gentlemen were thanked for their proferred services, and the proceedings came to a short termination. The strike, therefore, continues with unabated vigour, and what the upshot will be it is not easy to forecast.

An explosion, which has resulted in the death of one man, and in severe injuries to eleven other colliers, occurred in one of the pits of the Hall End Colliery, Westbromwich, of Mr. E. Phillips, on Saturday. The men had been at work 1½ hour taking out coal adjoining a place which had not been worked for between 30 and 40 years when the explosion took place. It is supposed that the sudden change in the atmospheric pressure brought the gas out of the old workings, and that it was ignited by the naked lights which the men were using.

TRADE OF THE TYNE AND WEAR.

Sept. 11.—We learn from Browne's Export List that although the coal and coke shipments from the north-eastern ports have been very considerable in August, yet they show a falling off as compared with August last year. The total shipments in August were 744,382 tons, against 779,169 tons in August, 1883, thus showing a decrease of 34,787 tons. The quantity is certainly not large, but it is on the wrong side. The Baltic trade has, on the whole, been very good, but steam coal continues in good demand, and 10s. per ton has been got for this coal in some instances. The demand for gas and house coal is improving, while that for coke is still only moderate for inland consumption, although for shipment there is a fair enquiry. On the whole, it is considered that the coal trade has improved during the week. There is not much sinking going on in connection with the coal trade at present; but at Brandon Colliery, in the Auckland district, belonging to Messrs. Straker and Love, who have done much in developing the resources of the South Durham coal field, a new shaft is now being sunk to the Busty coal seam. There are already two shafts on this section of the works, but a third shaft is necessary for ventilating purposes, and its completion will greatly facilitate the working of the extensive royalties there. A shaft is also being sunk at the Eltringham Colliery, on the south bank of the Tyne, near Prudhoe, and some interest attaches to the sinking, as it is put down for the purpose of proving a seam of Cannel coal which is known to exist there, and which is expected to be of considerable value. Very fine beds of fire-clay have been found at Eltringham, and the manufacture of fire-brick and other fire-clay goods, including fine glazed bricks for ornamental purposes, is extensively carried on there. At Blaydon Main Colliery, which was acquired by the Stella Coal Company last year, considerable improvements and extensions have been effected, a second drawing-shaft has been fitted up, and the output of coal, therefore, will be largely increased. These works were long worked by the late Mr. G. H. Ramsay, and Ramsay's coke and fire-bricks were well known and highly appreciated in the various markets.

There is no change of consequence in the state of the Iron Trade. Makers still struggle to keep up the price of pig-iron to the combinators' rate—that is, 37s. for No. 3, and manufactured iron remains at the low rates quoted of late. On Monday the Board of Arbitration met at Darlington to discuss the wages question, the employers having asked for a reduction of wages, and the operatives having claimed an increase. It is much to be regretted that these continual disputes should occur, resulting generally in arbitration, no doubt a good thing in its place, but it is possible to have too much of it. The men's wages are low as ever they were during the history of the Board of Arbitration, even in that disastrous year 1879, and it is not likely that the masters will persuade any arbitrator to bring them down lower. There is no doubt that these continual disputes inflict great injury in the trade. At every arbitration lately the question of establishing a sliding scale has been mooted, yet no steps have been taken to carry this desirable project into effect. There is no doubt that what is now required in the Durham manufactured iron trade is that the two claims should be withdrawn, that the possible delay and cost of a special arbitration should be avoided, and that practical steps should be taken for the establishment of a sliding-scale In the past year the rate of wages has been brought down greatly, as far as there is any probability of that course being pursued, and it is necessary now that some scale should be adopted which would steady the trade. Such a method when the basis is once fixed works without fear or favour, quickly and cheaply, and is in every sense fair to both parties, and allows to each such changes as the price fluctuations warrant.

There has been during the past few days a better feeling in the commercial world. The shipping trade is still dull, and many vessels are still working and scarcely earning any profit, but in some cases improved freights have been got, and it is now fully expected that home freights from the Mediterranean and some other quarters will now impove rapidly. On the whole, the chemical trade is improving, and there is an improved demand for soda. Bleaching powder has, however, receded a little in value.

In the Lead Trade there is a better demand for fine local lead, and at recent sales a slight advance in prices has been gained. The further sinking of the Green Hurth Mine, which has been in progress recently, has been watched with much interest by persons connected with the local lead trade. It was uncertain what might be the result of the operations when the Great Whin Sill was reached, and whether the lead would carry down into the hard strata. The directors at their last official visit to the mine had the satisfaction of seeing the lead still going down into the Whin, the working being then 2 or 3 ft. into the stratum.

At the iron trade meeting at Darlington, on Monday, there was a good attendance, both parties being well represented. Mr. Head, on the part of the masters, stated that the last return showed that the average net price of manufactured iron was 5*l.* 5s. 5d., as against 5*l.* 8s. 11d. in the previous quarter, which by Mr. Dale's scale would give a reduction of 2½ per cent. below the present wages rate; they, therefore, asked for a 5 per cent. reduction. Mr. Trow replied at some length on the part of the men, but mostly in general terms; he alleged that Mr. Dale was not infallible in the scales he had made, as was shown in 1871. If they were to grind down the men to the lowest in bad trade by the scale why should the men not have followed in good times. After further discussion and the remarks of the President, Mr. Trow held that the employers should be lenient now, and the men would respond in the future. The men's party generally appeared to have the impression that they would not submit to any further reduction from present rates. After some further discussion, as the board could not come to any arrangement, it was decided to adjourn the meeting till Sept. 19, with the understanding, as stated by the Chairman, that if no arrangements were then arrived at, the whole question should go before an arbitrator. The Eston Steelworks of Messrs. Bolckow and Vaughan, which have been closed several weeks, will be reopened on Monday next. Alterations have been effected which will enable the firm to manufacture steel-plates on a large scale. Orders are in hand for rails also. About 1000 hands will be employed.

REPORT FROM NORTH WALES, SALOP, AND CARDIGAN.

Sept. 11.—After a highly successful and honourable career of about a century, during which immense incomes have been received, the Snailbeach Lead Mine of Shropshire is to be closed. At a special general meeting, held in Oswestry, on Tuesday, it was formally resolved "That the company be dissolved according to the terms of the 132nd clause of the Articles of Association. A further meeting is to be held on Sept. 23, to confirm this or otherwise, and no doubt it will be confirmed. The company is a local company, and the closing of the mine, therefore, evokes more sympathy in the county than is usually felt in such events. In Cardiganshire considerable desire is felt that the new operations at the Cambrian Mines should be successful At the same time it is felt that the long land carriage and railway freight of the ore must militate against the full success of the mines.

The whole of the Principality, and especially the northern part of it, is alive with excitement at the near approach of the National Eisteddfod, which is to be held in Liverpool next week. It is a pity that there are no scientific, or at least scientific subjects connected with mining, for competition this year. There is one subject which should possess some commercial interest—"The Fisheries of Wales, and the Best Means to Develope them." Two of the adjudicators on this subject are Prof. Huxley and Mr. T. Fanning Evans, formerly Her Majesty's Inspector of Mines for North Wales.

A new project is on foot for making Holyhead a cotton port, and for running trains direct to Manchester, by means of which the cotton would be in Manchester by the time it now reaches the docks at Liverpool. New surveys are now being conducted along both sides of the estuary of the Mersey in connection with the project of making a ship canal to Manchester, a new Bill for which is to be presented to Parliament next session. The returns of the Cambrian Railway show an increase in passenger traffic for last week, but a falling off in goods, minerals, and merchandise, leaving a net increase since the commencement of the half-year of 79*l.*

The water in the Mostyn Colliery, near Flint, has now risen to the sea level, and all hope is abandoned of the possibility of resuming work at the colliery. The Eyton Pit, however, is being worked energetically, and it is intended to reopen the Hanmer Colliery. On the opposite side of the river the Neston colliers are out on strike for higher wages—an ill-advised proceeding, surely at the present time. The owners are contemplating closing the colliery in consequence of this action on the part of the men. The strike at Buckley continues, and, as the men are supported by the Union, it is likely to be protracted. At all the other collieries work is going on steadily, and a good winter's trade is anticipated.

The Liverpool Engineering Society has just visited the slate quarries of Mr. Greaves and the Welsh Slate Company at Festiniog. The members were hospitably entertained at lunch by Mr. and Mrs. Greaves.

The receipts of the Carnarvon Harbour Trust last month were 102*l.*, against 94*l.* in the corresponding month of the previous year. This does not indicate any falling off in the slate trade. Reference was made a few weeks back in these reports to the damage done to the schooner John Herbert, through the harbour authorities allowing a stray log of wood to float about the harbour neglected. The Trust has decided that it is not responsible for the damage done. Possibly, however, a court of law might decide otherwise. At Port Penrhyn there were last week six arrivals and 12 sailings, and at Port Dinorwic seven arrivals and 10 sailings. Each of these ports represent the quarry whose name it bears. Mr. Robinson, the owner of Talsawn and other quarries, Nantlle, had a narrow escape, on Wednesday, at Blaen-y-Cae Quarry, where he was knocked down by a descending wagon. The engines were immediately reversed, but his escape is considered marvellous.

TRADE IN SOUTH WALES.

Sept. 11.—The shipments of coal, &c., at Cardiff in the month of August were 540,885 tons foreign and 84,191 coastwise, with 10,385 tons patent fuel and 1958 coke; Newport, 137,747 tons foreign and 96,870 coastwise, with 173 coke; Swansea, 89,279 tons foreign and 63,620 coastwise, with 27,657 tons patent fuel, and 190 coke. Last week Cardiff sent away 125,283 tons foreign and about 20,000 coastwise, with 4240 tons patent fuel; Newport, 35,319 tons foreign and 24,472 coastwise; Swansea, 15,116 tons foreign and about 14,000 coastwise, with 4664 patent fuel. Good colliery-screened steam coal is quoted at from 10s. to 11s., and house coal at from 8s. 6d. to 9s. 6d.

The level that the Messrs. W. and E. Beddoe sometime ago purchased on the Gelligaer side at Llancaiach for the purpose of developing and working the Mynyddislwyn rider vein of house coal, which proves of a good quality and moderately thick as well, in this district, has just passed into the hands of a fresh firm, having been purchased by Messrs. T. J. Evans and Co., who are about to open up the workings so as to work the above seam during the coming winter. The house coal level on the Heol Fawr, near Gellihir, has been purchased by Messrs. Mitchell, Freeman, and Harris, the well-known promoters of the New Gwerna Colliery at Maesycwmmwr, and they have secured a large taking of land on towards the mountain under the Tonteilwr, Twyn, Gellihir, and Castle Llwyd farms, where they expect to find a large area of the Mynyddislwyn seam of house coal to work after going through the fault.

A quiet tone continues to characterise the Forest of Dean coal trade. House qualities are in fair demand, and the Irish trade has considerably developed during the past two or three months. Districts of the Sister Isle where the Forest house coal has not before penetrated are now supplied, and the coal seems in many respects well suited to the Irish market.

The shipments of iron in the month of August amounted to 5388 tons at Cardiff, and for the first eight months of the year to 58,724; Newport (August), 9564 tons; eight months, 86,288; Swansea (August), 586 tons; eight months, 3042. Last week Cardiff sent away 2857 tons, and Newport 1860. The arrivals of iron ore at Cardiff from Bilbao were 5149 tons, and 1464 from other places; Newport received 3250 tons from Bilbao and 3300 from other places. Prices remain low. The tin-plate market has been quieter during the last week, and prices lower. Although 15s. 6d. and 16s. have been obtained in some instances, 6d. lower must be taken as the market price. "Wasters" are quoted at from 14s. 3d. to 14s. 9d.

The steelworks at Swansea and Pontardulais are, it is reported, working with regularity rather than briskness, and prices of plates and bars are unchanged, and a good deal of satisfaction is expressed in commercial circles at the prospect of the once famous

Ironworks at Ystalyfera (Swansea Valley) being restarted. Cyfarthfa Iron and Steelworks are as busily engaged as most works apparently. The produce, however, does not appear to be sent away to any great extent, for there is an enormous accumulation of Bessemer pig at Knysfach. At Rhymney the works are somewhat limited in operation; hardly any rails are being worked here or at Ebbw Vale, where, however, the merchant bar mills are kept going with tolerable regular order; so is one puddling forge for iron-making. Tredegar is on a near level with its industrial neighbours—not a whit worse off in any case.

REPORT FROM DERBYSHIRE AND YORKSHIRE.

Sept. 11.—The week, so far, has been a quiet one throughout the North-Midland districts, for the racing carnival at Doncaster draws large numbers of both miners and ironworkers from their ordinary employment. At many places there was at least one holiday during the week, and in not a few instances this was more compulsory than otherwise, seeing that the Midland and other railway companies, in view of the great increase in the passenger traffic, shunt the greater part of the ordinary mineral traffic during the whole of the week. This, of course, affects the Derbyshire collieries, but will cause no inconvenience, seeing that a good many of them have for a considerable time been only working about three days a week, and few more than four days. The trade with the Metropolis from Derbyshire, so far as regards house coal, has kept up very well, and as merchants are fairly off for stock the stoppage of the traffic will not be felt, unless it is, perhaps, as a relief to some. The furnaces know no holidays, and for these no difficulty is experienced in obtaining the necessary supplies of fuel. Of late the railway companies have taken an increased tonnage of hard coal, but, of course, not so much as usual has been sent away. The foundries in the Staveley, Clay Cross, Stanton, and other districts have worked tolerably well as regards heavy work, but there is still the same comparative quietness as regards light and ornamental castings.

Not much alteration has taken place in the state of the Sheffield trades, but in some few branches it is admitted that business is looking rather more promising with respect to the remainder of the year. The mills engaged in heavy armour-plates are as busy as ever, and no short time can be allowed in this department. Still the numbers that attended the Doncaster Town Moor from Sheffield on Wednesday numbered some thousands. In several branches this was of course not felt, seeing that a considerable number of the workmen have for some time past been working only about four days a week. This has been the case more especially as regards ordinary cutlery, for which the demand is still but moderate. In the finer qualities, however, some of the houses are rather better off than they were, although as yet the orders from America that usually come in about this period have scarcely made their appearance as yet, at least to an appreciable extent. Tool-makers have had but a moderate time of it, especially as regards the lighter work; but file-makers have been fairly employed. All things considered the make of steel has kept up very well, more particularly as regards Bessemer, which is now producing qualities suitable for several kinds of tools, as well as for common cutlery. Some of the works have also done more recently in rails than for a considerable time past, and, of course, at improved prices. In springs and other kinds of railway material as well there is just now more doing. Crucible steel has gone off in fair quantities in its plain state, whilst a good deal has also been used for heavy castings for engines and machinery, as well as for lighter work, including wheels, the demand for which has kept up to the average. In ship and boiler plates business has not altered much, the output being still far below what could be produced were the requirements greater. Some good orders are in hand for hoop iron, as well as for wire and bars. The foundries continue to be fairly off for work in pipes, fittings, palisadings, stoves, grates, and ranges, whilst a fair amount of business is doing at the engine and machine shops. In railway wagons makers are not quite so busy as they were, still there is sufficient doing to keep the workmen fully employed.

The South Yorkshire Coal Trade has kept up very well, and a large tonnage for gas purposes has gone to the Metropolis during the last few weeks. Steam coal has in no way fallen off, and a large tonnage continues to be sent to the Humber ports for exportation to the North of Europe, as well as to several iron-making districts. A large quantity of small coal continues to be absorbed for converting into coke, for which there is a steady demand.

Mr. J. Stores Smith, for many years the able and indefatigable managing director of the Sheepbridge Coal and Iron Company, has just retired from that position for the purpose of seeking rest. His advice and counsel, however, will be still available in some less arduous and responsible position.

REPORT FROM LANCASHIRE.

Sept. 11.—Although there is still generally only a quiet tone in the Coal Trade of this district there is a turn towards improvement. In the better classes of round coal enquiries are coming forward more freely, and consumers are beginning to take in stocks for winter requirements. The extra demand is not, however, so large as to cause any pressure for supplies, and the orders coming forward are not more than sufficient to keep pits going about four days a week. There is, however, considerably less coal lying under on load on the pit sidings, and prices, although there has not as yet been any actual advance, are hardening up to the full list rates. For the best qualities of Wigan Arley colliery proprietors in most cases are now holding firmly to 9s. per ton at the pit mouth as their minimum price, and it is only in a few exceptional cases that there are sellers at so low as 8s. 6d. Second qualities of Arley and Pemberton Four-feet average about 7s., and common round coal, suitable for house fire purposes, about 6s. per ton. Common round coals for steam and forge purposes still meet with only a dull demand, so far as local requirements are concerned, but the recent activity in the shipping trade has helped to give a firmer tone to prices, and there is very little common round coal now to be brought at under 5s. 6d. per ton at the pit mouth. Engine classes of fuel continue only in moderate demand, and so far as slack is concerned there is a tendency rather towards weakness. Burgy at the pit mouth averages about 4s. 6d. to 5s., but it is only in exceptional cases that 4s. 3d. is now being got for best slack, 3s. 9d. to 4s. being about the average price for good qualities, and 3s. 3d. to 3s. 6d. for the common sorts at the pit mouth.

Shipping has scarcely been so brisk during the past week, but prices are maintained at about 7s. 3d. to 7s. 6d. for good qualities of Lancashire steam coal delivered at the High Level, Liverpool, or the Gorston Docks.

In the Iron Trade a steady tone is being maintained at low prices, but there is no large weight of business doing. There is a disposition to buy pretty largely for forward delivery at the minimum prices that have recently been taken; but makers who have made sales at low prices are showing a disinclination to commit themselves to farther engagements, except at some advance upon the lowest rates, and as buyers are not disposed to follow any upward movement, business is rather checked in consequence. Lancashire pig-iron makers still quote 41s. to 42s. less 2½ for forge and foundry qualities delivered equal to Manchester; but they are only getting a very small weight of new orders, and old contracts are running out faster than they are being replaced. For district brands rather higher prices are being quoted, 41s. 6d. to 42s. 6d., less 2½, being now the minimum for Lincolnshire brands delivered here, whilst for some of the Derbyshire brands 1s. to 2s. per ton above these figures is asked. Hematites continue in very poor demand, and extremely low prices are taken to secure orders.

In the manufactured iron trade there is a moderate business doing, on the basis of 5*l.* 12s. 6d. for good qualities of Lancashire and North Staffordshire bars delivered here, and this appears to be the minimum price that makers are prepared to accept.

In the Engineering Trades there is still a very fair amount of work in hand, but generally a falling-off in the weight of new orders coming forward is reported.

THE COAL AND METAL TRADES IN CHINA—No. I.

The official reports upon the progress of mining and metallurgical matters in China during last year are of more than usual interest, and contain a large amount of valuable technical information. The salt trade of Ssu-ch'uan has within recent years become a Government monopoly, and the province has derived a considerable annual revenue from the supply of parts of Hupeh and Hunan, to the detriment of the Huai salt trade. The continued struggles between the Governments of Ssu-ch'uan and Hukuang have at last terminated in a compromise, whereby Ssu-ch'uan agree to export for consumption in Hukuang the amount of salt covered by 10,000 permits only. Each permit represents 50 packages, weighing 200 catties a piece, so that one permit covers 10,000 catties, and 10,000 permits 100,000,000 catties, or 1,000,000 piculs. A picul is valued at 2 34-10 taels, so that the total value of salt exported eastward from Ch'ung-k'ing may be put down at 2,350,000 taels. The brine wells of Wan-hsiem and those in the neighbourhood of Kuei-chou Fu supply the more eastern portion of Ssu-ch'uan.

With regard to the imports of metals at Foochow, they were about the same quantity as last year. Lead, in pigs, 55,043 piculs; value, 200,563 taels. Prices ranged from $5·35 to $5·60 per picul. Tin slabs, 5410 piculs; in 1882, 5389 piculs. At Hankow, says Mr. Alabaster, there is in metals a falling off; nor does the hardware trade, for which I have long prophesied an opening, show the signs of development I hoped would have been seen ere this. With our superior appliances for manufacture, the monopoly of the market should pass into our hands; but it can only be by careful study of the needs of the people and the offer of articles that they can use that we can gain a footing. Foreign spades are too cumbrous for the weak Chinaman to handle; their hoes are used for different purposes to ours, and need to be of different make; knives and choppers, employed in native ways, require special modifications to come into favour; but given the Chinese models and an understanding of why their form and make have been adopted, we should be able to improve upon them, both in quality and cheapness, and soon drive them out of favour. No attempt, however, seems to have been made in this direction.

At Kiungchow the import of metals shows a slight improvement, and would there is reason to believe admit of considerable expansion were it not hampered by vexatious taxation. Indeed, the system of taxing all foreign goods before they leave the port, which goes on in violation of express agreement, does much to restrict their circulation. Iron, for example, used to be imported in considerable quantities for re-export to the opposite peninsula, and though pieces of old machinery were pointed out as evidence of its origin the authorities persisted in treating it as a Chinese product until they have almost extinguished the trade. This is one of the many facts which go to show how futile it is to make any arrangement to save our goods from local taxation unless the authorities immediately concerned are fully compensated for the loss which the change entails upon them. About three-fifths of the total import is used for the manufacture of agricultural implements, while the remainder goes to make the nails used in the junk-building trade. The native blacksmith has a fancy for old foreign iron. He finds it of all shapes and sizes, and can easily select a piece roughly resembling the article he wants to make. It suits his rude workmanship, and, what is more important, saves fuel.

Kerosene oil is gaining steadily in favour with the natives, and as it affords a much better light than the native pea-nut product, and is only about two-thirds of the price, it is likely to come into much more general use. The necessity of buying the high-priced foreign lamp, which restricted its consumption in the past, has recently been obviated by the manufacture of a very convenient and serviceable little lamp out of the material of the oil can itself, which is gradually finding its way into country districts. Every temple with any claim to respectability now boasts a gaudy Canton chandelier, but care is always taken that the native oil is burnt in the immediate presence of the presiding deities.

At Ningpo the import of iron shows a very slight gain over that of 1882, which was some 13,000 piculs less than the import of 1881. It is surmised, though without much reason, that the supply is drawn from Shanghai. A more probable account is that bad times have not yet enabled the markets to recover from the glut of 1881. Tin is largely used at Hangchow and Shaohsing—more especially, of late years, at the latter town—for the manufacture of silver paper, which, made up to imitate ingots of sycee, is burnt in large quantities at the Visit to the Tombs in the spring, and at the Festival of the Seventh Moon in the autumn. This silver paper is in less demand in seasons of bad trade, such as the last two years have been, and the import of tin accordingly shows a falling off. The rapid advance into favour which kerosene oil had made during the two preceding years caused, towards the close of 1882, an over supply in the Shanghai market. The consequent cheap rate induced native merchants at Ningpo to purchase in the hope of a rise. The speculation proved, apparently, a losing one; for, though opportunities of repeating it offered themselves during the year, the merchants did not avail themselves of them. It is quite possible, however, that this neglect may have been due to the want of funds, and the little or no credit given by the banks. The use of kerosene is, it is said, gaining ground in the country districts, but in the city of Ningpo itself its consumption is discouraged by the Prefect, on the plea of the danger of conflagrations, which, indeed, from the careless method of selling the oil, and the flimsy construction of shop fronts, are likely enough to occur. At the same time the oil itself, Devoe's, is found in experience to be not as carefully refined as formerly, a fact that cannot fail to affect the sale as much, probably, as the Prefect's proclamations. Coal can only be sold at Ningpo now in small quantities of 5 cwts. or less at a time, and at a loss to the importer. The prospect of direct import during the present year is consequently very slight.

Referring to native Chinese coal, an exporter at Tamsing states that the quality of the Government colliery coal is not so good as the coal obtainable previous to opening of colliery. At that time the market coal was larger in size. It had about 30 per cent. dust, 50 per cent. of round, rubbly coal, and 20 per cent. of large coal; and this kind was for many years taken at Shanghai, to some extent, for steam and other purposes. The colliery people separated each kind—the dust, nuts, and large coal, retaining all the best for Government purposes, and selling the other two kinds separately. The practice of riddling or sieving broke the coal into small pieces, and so spoilt its market value. What is offered by the colliery now as market "nuts" would have been rejected in former years, and received only as "good dust." Their prices, too have been far too high—much too high to enable shippers to lay the stuff down in Shanghai at a profit. Had they not held out obstinately for higher prices than merchants could afford to give, a larger and more regular business would have resulted. For the past few years the bulk of supplies has been drawn from Chinese miners, who mine in the old-fashioned way, and produce a better sized coal, and at about $3 per 100 piculs cheaper than colliery coal—that is, you can buy coals cheaper by 6¼ a ton from Chinamen than from Government. Another obstacle in the way of trade, when dealing with the colliery people, is their breach of contracts. They promise to deliver quickly on arrival of steamers, but never do. On almost every occasion they delay sending coals to steamer till second or third day after arrival; and sometimes steamers are loaded entirely with Chinese-mined coal before a boat from the colliery makes its appearance. Under the management of Chinese the colliery can never be a success. Even if the coals were good quality and price low you could never calculate on prompt delivery, which is everything. All coals I buy I get from the Chinese, but although they are better than colliery's they are inferior to coal delivered in the early days of the trade. The demand has consequently fallen off at Shanghai, and Kelung coal shave there a very bad name now. The present quality is used by sugar refineries, a large coal not being necessary. Quantities are also taken by Chinese and even foreigners to mix with English and Australian coal, to bring selling price down. Dust is taken by Chinese to some extent to supply blacksmiths, &c. The trade at present is in a bad way. The colliery people are jealous of native miners, and threaten continually to shut up their mines. The policy of asking too high prices is a wrong one. If native mines are closed the trade at Kelung will be next to nothing, and will die away rapidly. I hear that colliery people are opening or boring at Lwan Lwan with an idea of sinking a shaft there, and deserting the works at Coal Harbour. The price of medium quality, called nuts, derivable from Chinese mines, is cheaper than we have known for years—$2·25 per ton alongside. Kelung coal in former years used to be used by itself for steam purposes; now quality is so bad no steamers will use it except those calling there. The Government colliery has been without any foreign employee since June 1883.

QUEENSLAND SILVER MINING—GREAT SUCCESS.

The managing director of the Ravenswood Silver Mining Company, of North Queensland—Mr. Richard King—favours us with the results of the operations at the company's mines during the first half of the present year. It appears that in the half-year from Jan. 12 to June 28 there have been shipped 353 tons 6 cwts. 1 qr. 9 lbs. of ore, of the value of 9321*l.* 19s. 3d.; there are also 71 tons 2 cwts. 3 qrs. 14 lbs. at the port, value 1255*l.* 3s. 9d.; 48 tons on sampling floor, value 1032*l.* 19s. 9d.; making a total of 11,610*l.* 2s. 9d. Against this there are the probable cost of transit, bank, and returning charges, D. P. McEuen's agency, 89 tons 8 dwts. 2 qrs. at 3*l.* 10s. per ton, 348*l.* 15s. 2d.; James and Shakspeare's agency, 50 tons 13 cwts., at 1*l.* 11s. 6d. per ton, 79*l.* 15s. 5d.; 213 tons 5 cwts., at 1*l.* 7s. 6d. per ton, 287*l.* 18s. 9d.; 119 tons, at 1*l.* 7s. per ton, 160*l.* 13s.; transit charges to port, 119 tons, at 52s. per ton, 309*l.* 8s.; bank charges on gross amount, 1 per cent., 116s. 2s.; mine charges, brokage, 21*l.*; carriage, 94*l.* 15s. 8d.; forwarding charges, 20*l.* 0s. 5d.; chaff coal, 22*l.* 12s.; surface work, 112*l.* 16s.; Langland's machinery account, 201*l.* 14s. 11d.; main shaft underground work, 1575*l.* 10s. 10d.; props, 18*l.* 2s.; stores permanent works account, 523*l.* 13s. 3d.; sawn timber, 254*l.* 2s. 9d.; transit of ore, 922*l.* 12s. 7d.; wages, 1789*l.* 14s. 8d. = 6859*l.* 7s. 6d.; leaving a profit of 4750*l.* 15s. 2d. The second-class ore raised during the six months, and which requires to be machine dressed was 2023 tons, assay value 10*l.* per ton, 25 per cent. on the assay value is allowed for returning and transit charges, dressing, bagging, and loss of ore in dressing, estimated profit 7*l.* 10s. per ton, 15,172*l.* 10s. = total profit, 19,923*l.* 5s. 2d.

In estimating the value of the second-class ore at 10*l.* per ton, there is no reason to doubt the given value. Fair sampling and assay gives 20 per cent. lead to the ton of ore, If those interested in the mine will look through the account sales to hand they will find that the yield in silver is a little over 2 ozs. per unit of lead, with the ore dressed up to 70 per cent. lead (out of a possible 86 1-6th per cent.) the yield of silver should be over 140 ozs., value 36*l.* per ton, or 10·3½ per unit nearly. The mining stores on hand are firewood, 163 cords, 146*l.* 6s.; props, 1000, 95*l.* 16s.; split slabs, 3000, 120*l.*; saplings, 2000, 60*l.*; 20 bales ore bags, 250*l.* = 672*l.* 2s. In addition to the above there are 3085 tons of second-class ore raised prior to Jan. 12, estimated profits, 7*l.* 10s. per ton, 23,137*l.* 10s., besides there was a large amount of surface or carbonate ores raised before the sale of the mine to the company, from which is now being bagged and sent away about 70 tons per month, value about 12*l.* per ton. Since the opening of the mine there has been shipped to England 1369 tons of ore, equal to 762 tons of pig lead, containing 173,270 ozs. of fine silver, a little over 5¼ tons.

THE PREVENTION OF OVERCROWDING, &c., AT MINES.—Of late years great attention has been paid to disengaging hooks, having for their object the prevention of over-winding, from which many lives have from time to time been sacrificed. In all well-appointed mines some such apparatus should be found for safety purposes. Those now best known are Ormerod's and King and Humble's, and may be said to consist of flat tapered plates held in position by a copper rivet. Below the pulley in a head-frame there is fixed a plate or tube, on passing through which the plates of the hook shear off the rivet and so liberate the rope, at the same time throwing out projections by which the cage remains suspended by the hook to the plate or tube. Mr. JOAN LINDLEY, of the Clifton and Kearsley Collieries, in Lancashire, has just brought out another invention in the shape of a clip-cage, its object being to prevent accidents arising from over-winding or the breaking of the winding rope. In the case of over-winding the orifice through which the rope passes presses together the loose iron jaws from which the cage is suspended, releasing the central pin, which slips out of the jaws, and the cage remains suspended, instead of being dashed through the head-gear. The apparatus to prevent the cage falling down the shaft through breakage of the rope consists in connecting the lower ends of the top rods to a pair of levers mounted on each side of the cage, the other ends of the levers being forked and connected to opposite ends of a pair of links, which are fastened to the ordinary wooden iron guide-rods. As soon as the cage is released from the rope the inner arms of the levers rise and force the links together. The inner side of the forks being provided with wedge projections which come in contact with similar projections on the sides of the links the cage remains suspended, wedged fast to the guide-rods. The new invention has been introduced to the notice of the Bolton and District Colliery Managers' Association, and appears to have been warmly appreciated by that body.

THE STAFFORDSHIRE COLLIERS' STRIKE.—In the interest of the South Staffordshire coal trade we are not sorry that the attempt made this week to close the dispute between masters and men there has failed. The appearance of a self-constituted Court of Appeal, consisting of five disinterested and well-meaning gentlemen, who wished representatives on both sides to refer the dispute to them with a view to some agreement, was scarcely calculated to effect a permanent settlement. The annals of industrial complications in this country afford no more unsatisfactory record than the condition of the South Staffordshire coal mining industry during the last few years. Unsettled to the last degree, and subject to ruptures of the most serious import to business, a parallel can be found only in legislative difficulties at St. Stephen's. The causes, doubtless, are numerous. But chief among them is the habit into which the employed have fallen of holding economic arbitration at lighter esteem than violent counsel from their leaders. Of that habit, the repudiation of the award whose issue occasioned the present strike is by no means the only indication. For the masters now to accept a compromise would be to countenance a policy fatal to the interests of the district. The awards of arbitrators must be held sacred. When the Court of Appeal assembled, therefore, the majority of the masters at once settled the matter by passing over the half-and-half offers made by the men and asking which side was wrong, they in upholding the award, or the men in repudiating it—a question to which there could be but one answer. The period during which the present award holds good terminates on Sept. 27. Then, but not till then, may appeal be made to another arbitration—if indeed the employers will consent to any such course. Moreover it is obvious that the establishing of the principle for which the masters are contending will confer more lasting business benefit on the Staffordshire and other colliery fields than could be afforded by an arrangement dictated by temporary expediency.

NILE STEAMBOAT SERVICE.—The ordinary passenger steamers and all the other steamers on the Nile worked by Thomas Cook and Son under their arrangements with the Egyptian Government are now occupied in the conveyance of the troops, stores, &c., in connection with the present expedition to the Soudan, and it is expected that they will be so occupied during the greater portion of the coming season, the firm having contracted with the English Government for the conveyance of everything connected with the expedition from Assiout to Wadi-Halfa. Mr. John M. Cook leaves London on Sept. 17, and expects to be at Assiout by Oct. 1, in time to personally superintend the movements of the flotilla of row-boats, which he has pledged his word to Lord Wolseley shall be at Wadi-Halfa sometime in the first week of November. The steamers connected with the Postal Department which usually convey passengers from Assiout to Assouan are also being used by the Government in connection with the military expedition; therefore, at the present time it is not possible for any travellers on the Nile to be conveyed by steamer unless they have the necessary authority from the Military Department. It is hoped that by the end of November one or two of the tourist steamers may be at liberty for the purpose of conveying passengers.

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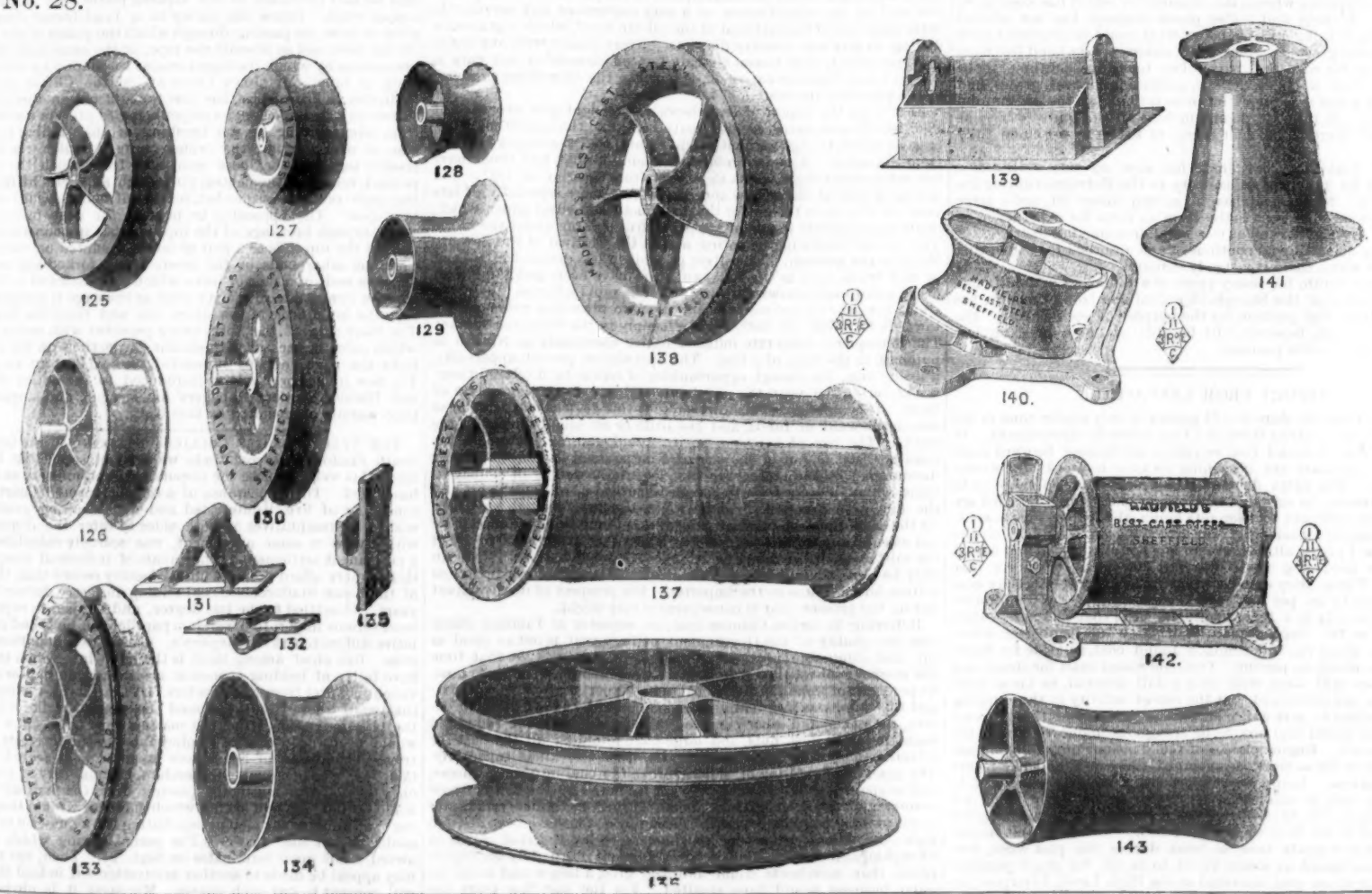

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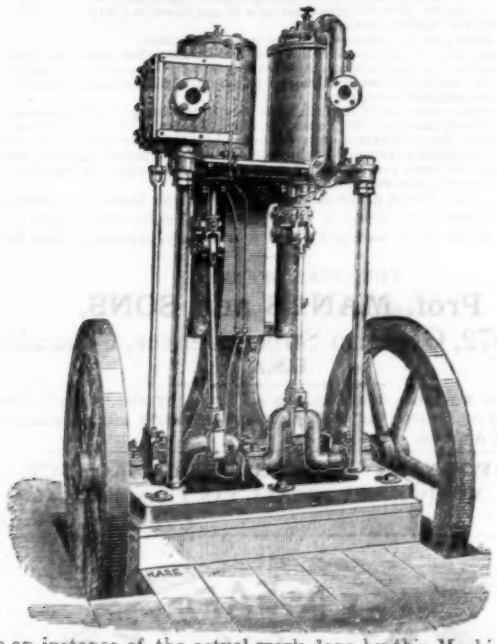

As an instance of the actual work done by this Machinery in various kinds of ground, some of it the hardest rock, it may be mentioned that in Cornwall, irrespective of the work performed by the "Champion" Rock-borers and Air-compressors purchased by various Mines, the drivage, rising, sinking, and stoping done by contract by the Proprietor with his own Machinery now amounts to over 1350 fathoms.

Several of these Air-compressors, ranging from 3½ to 12 tons in weight may be seen in constant work in the Camborne Mining District.

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New, slightly defective.
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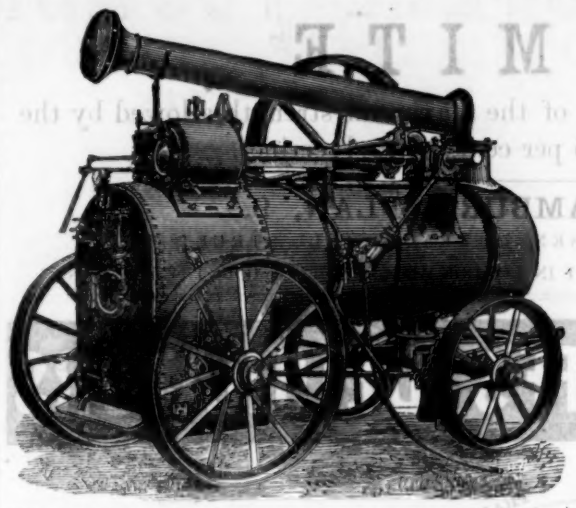

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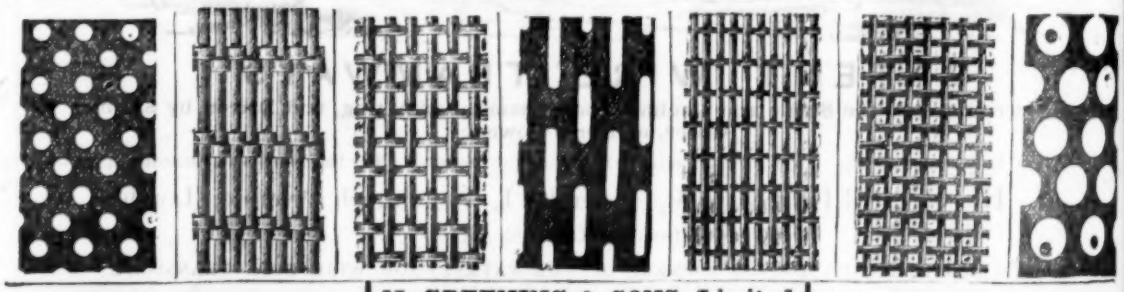

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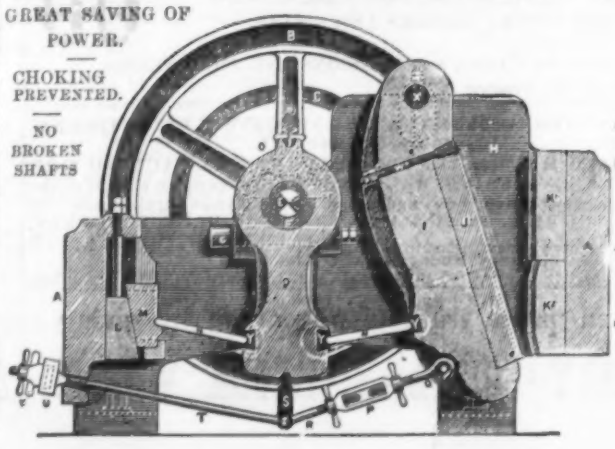

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JAWS adaptable either for CUBING or CRUSHING
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Jigger Bottoms and Cylinder Covers woven ANY WIDTH, in Iron, Steel, Brass, or Copper.

EXTRA STRONG PERFORATED ZINC AND COPPER RIDDLES AND SIEVES.

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SILVER MEDALS AWARDED AT CORNWALL POLYTECHNIC 1872 AND 1876.

THE WELL-KNOWN PATENT SELF-ACTING ORE DRESSING MACHINERY, as in operation at most of the large Mines in the Kingdom and Abroad, is now supplied solely by THE PATENTEE AND MANUFACTURER, Mr. GEORGE GREEN, Mining Engineer, AT GREATLY REDUCED PRICES also all descriptions of Mining Machinery, including

GOLD AND SILVER AMALGAMATING MACHINERY, complete Stamp Mills, Water Wheels, Steam Engines, &c.

ROLLER SHELLS FOR CRUSHING MILLS—a speciality.

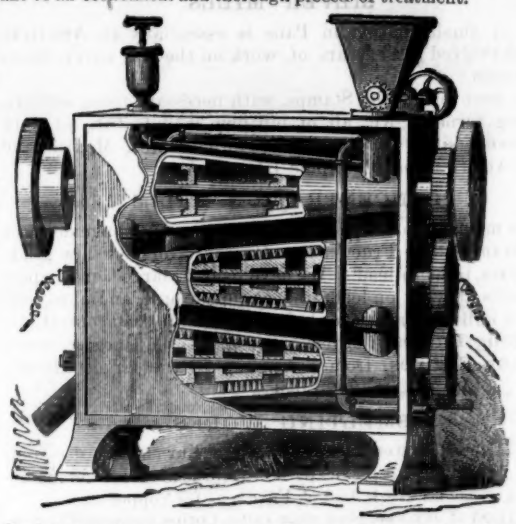
SPECIAL DESIGNS FOR EXPORT AND DIFFICULT TRANSIT.

Prices and particulars on application to the Manufactory, ABERYSTWITH, SOUTH WALES.

NOVEL ELECTRO METALLURGICAL MACHINE.

PROFESSOR JAMES MANES AND SONS call the attention of miners, mineowners, capitalists, and others interested in the working of gold or silver mines to their new Electro Metallurgical Machine for extracting fine and rusty gold from sands or tailings of stamp mills, or the sands of hydraulic gold diggings, or from the black sands on the coast of Oregon or California, and other parts of the world where gold is found.

The problem that has long troubled the worker of free-milling gold and silver ores is a method to save the mineral now lost in the tailings of stamp mills or flumes. This alone, if it could be saved, would amount to many million dollars profit each year, besides enabling the working of much territory which is now lying idle for want of an economical and thorough process of treatment.



Prof. James Manes and Sons, of Denver, Colorado, U.S., have invented a machine (represented in the above engraving) which it is claimed will save nearly the entire amount of mineral which passes through it, the loss not being over 10 per cent., and in many cases not in excess of half that amount. The machine is a cheap and practical process—it never need stop for charging or cleaning up, being nearly self-acting. Steam, electricity, and mercury are used in the process of extracting the mineral.

This machine or amalgamator is adapted for free-milling gold or silver ores, or refractory after roasting. It consists of a series of three or more large cylinders, wider at one end than the other, placed one above the other in a horizontal position, a shaft or spindle running through the centre of each.

The ore and mercury are fed into the first cylinder, passing into the second, and then to the third. The first cylinder is furnished with steel mullers which nearly touch the sides of the cylinder, and revolve at a good rate of speed, mixing the mercury and ore. The second cylinder is furnished with large steel brushes attached to the shaft or spindle, revolving at a high rate of speed; through this a current of electricity is furnished by a Westinghouse dynamic electro machine, which materially assists in gathering the particles of very fine gold together, and thoroughly amalgamating the metal and mercury. The third cylinder is similarly furnished to the second; into this the amalgam passes, and is again acted upon and mixed by the brushes to catch any gold which might have escaped amalgamation in the second. A fourth cylinder may be used if found necessary.

The amalgamated pulp then passes through a revolving copper drum, plated with quicksilver inside. As the drum revolves it takes up the most part of the amalgamated gold. As the inside of the drum is constantly washed with a spray of water from perforated pipes fixed inside of said drum, a clean-plated surface is constantly brought in contact with the pulp or tailings as it passes out from the cylinders. After leaving the drum it falls down on to incline copper plates, the same as is now used in stamp mills.

The amalgam can be collected from the drum and plates without stopping the machine, and any live quicksilver that passes will be caught in syphons. The tailings are carried off with the water. The machine when attached to the flume will be driven by the waste water; it sifts the fine sands from the coarse gravel, and amalgamates it as above.

The specific points claimed by Prof. Manes and Sons in their patent are—

1.—The saving of almost all the mineral passing through the machine.

2.—The loss being less than 10 per cent.

3.—The entire absence of loss of the amalgamated material, thereby saving all the mercury, which, with the processes now in use, there is a large loss both of mercury and the precious metal.

4.—The small cost per ton at which the ore can be treated.

By the addition of the powerful current of electricity that passes off the revolving brushes, the most minute particles of gold will be caught and retained, which in the ordinary flume and stamps passes off with the water; this often amounts to a large percentage.

The inventors state that if English stock companies will give their assistance to work the black sands of Oregon and California by paying for the building of the machines, they will take a share of the gold for their services, or they will send their machines to any part of the world, or will sell patent rights to those desiring any of their patent machines or revolving furnaces for roasting or smelting ores, ball pulverisers, &c.

Prof. James Manes and Sons are agents for the Morey and Sparey Ball Pulveriser, that crushes and pulverises at the same time, and does as much work as eight stamps in a day, crushing either wet or dry.

PRINCIPAL OFFICE OF

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THE BLAKE-MARSDEN NEW PATENT IMPROVED STONE BREAKERS AND ORE CRUSHERS.

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FOR REDUCING TO AN IMPALPABLE POWDER, OR ANY DEGREE OF FINENESS REQUIRED,

GOLD QUARTZ, SILVER, COPPER, TIN, ZINC, LEAD

AND ORES OF EVERY DESCRIPTION

PATENT REVERSIBLE CUBING and CRUSHING JAWS, IN FOUR SECTIONS,

WITH PATENT FACED BACKS, REQUIRING NO WHITE METAL IN FIXING.

CRUCIBLE CAST-STEEL CONNECTING RODS. RENEWABLE TOGGLE CUSHIONS, &c.

OVER **4000** IN USE.

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PULVERIZER.

"I have great pleasure in bearing testimony to the merits and capabilities of your patent combined fine crusher and sieving apparatus. I have tried it on a variety of ores and minerals, and it pulverizes them with equal success. You can put in a small paving stone and bring it out like flour."

"In reply to your favour, I have much pleasure in informing you that the 12×3 Pulverizer we had from you is giving us every satisfaction. The material we are operating on is an exceptionally hard one. I am well satisfied with its working."

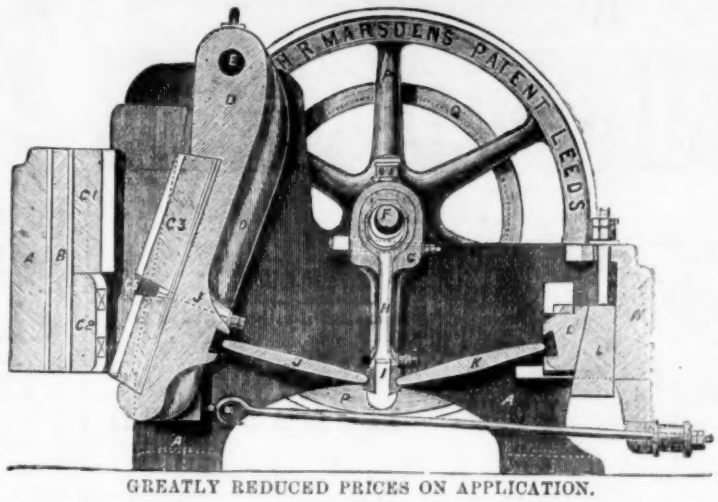
"Our experience is that the motion and mechanical arrangements of your machine are the best for pulverizing that we have ever met with."

"The reports from our mines as regards the working of your Fine Crusher (20×5) recently supplied are very favourable, although we cannot quote you exact figures. On being got into position it was tried *by hand*, with the result that it made short work of the biggest pieces of ore we put into the hopper. You might say how long you would take to deliver another of the same size."

"As I once before stated, your machine is a perfect pulverizer."

"I am sure the machine will be a success, and a great one, and there is any amount of demand for such a machine. We can work it with 20 lbs. of steam, and our engine, which is a 12-h.p., plays with the work, in fact we run the Stonebreaker and the Pulverizer both together with 35 lbs."

Also Cement, Barytes, Limestone, Chalk, Pyrites, Coprolite, &c., &c. These Machines are in successful operation in this country and abroad, and reference to users can be had on application.



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ROAD METAL BROKEN EQUAL TO HAND, AT ONE-TENTH THE COST.

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"I now order Three of your Stone Crushers, size 15 × 10, to your very best construction, and to include two extra sets of Jaws and Cheeks for each. The last two 24×13 machines you sent which are at work in this colony, are doing very well. You soon find that the railway contractors will adopt your machine preference to the colonial ones—two of which I have. I know contractors have had as many as nine of them, which have not very good satisfaction. Once they know of yours thoroughly believe you will do a good trade with the colonies. For reference the high character of your constructions you can refer to having used them with the very best results, both in New Zealand and this colony, and much prefer them to the colonial article, in point of construction and less liability to go out of order. material we are crushing is very hard blue stone, for railway purposes. Push on with the order as quickly as possible; I do think it necessary to have any engineering inspection. I brought your machines prominently under the notice of all contractors in this colony, likewise the Government. Many of contractors have spoken to me in reference to their capabilities, I could only tell them that they are by far and away the best most economical I ever used. The very fact of me having purchased now Eleven from you at various intervals and various sizes, and above 12 years ago, and having tried all the other makers, is sufficient guarantee of the capabilities and the working of your machine. Yours in every way surpass all others."

"Some of your testimonials do not give your machines half the due. I have seen men hammering away on a big rock for a quarter of a day which your machine would reduce to the required size in quarter of a minute. I would guarantee that your largest size machine would reduce more of the Cornish tin capels (which is the hardest rock of England) in a day than 200 men, and at 1-25th cost."

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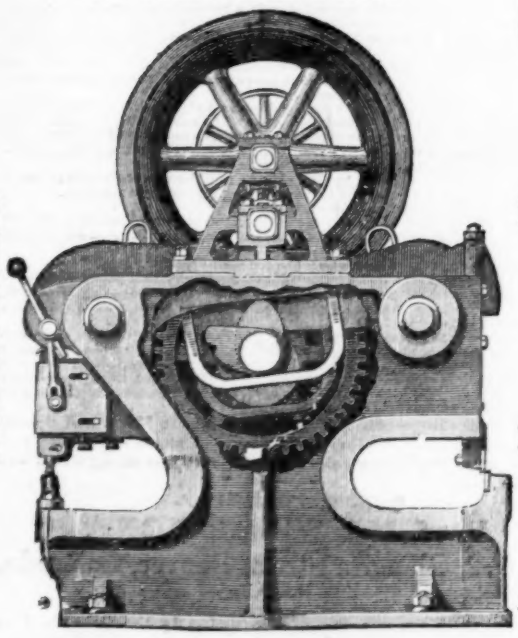
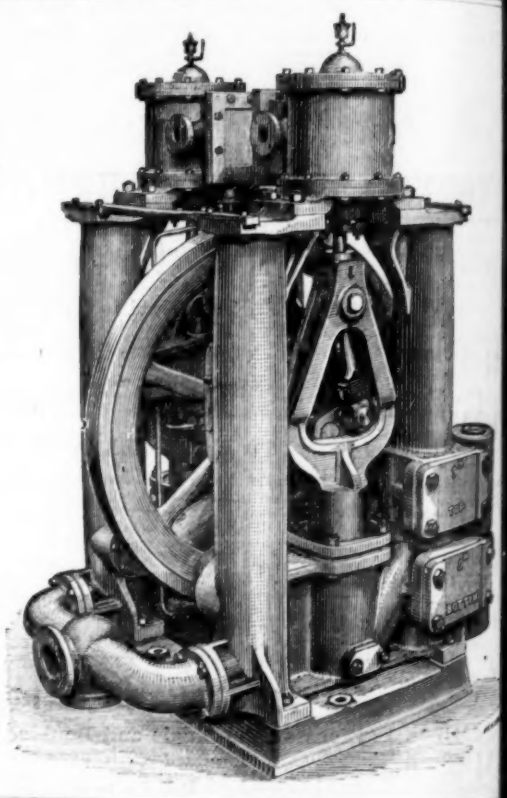


DISENGAGING APPARATUS.



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LEATHER MILL BAND AND HOSE PIPE MANUFACTURERS,
LONG LANE, SOUTHWARK, LONDON.
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Is the only Pump from which the disc can be removed by breaking the joint on a single face only.

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